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Potential Natural Vegetation of the Mississippi Alluvial Valley: Bayou Meto Basin, Arkansas, Field Atlas

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September 2012

Environmental Laboratory

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Final report

Abstract

Over the past three decades, extensive field studies of wetland plant communities have been conducted in the Mississippi Alluvial Valley. These field studies have been carried out for various purposes under the auspices of federal and state research programs or in conjunction with Corps of Engineers project planning efforts. In the process, a wetland site classification approach has evolved based on hydrology, soils, and geomorphic setting. The research data and classification system have been recently used for a new purpose: to create a set of Potential Natural Vegetation (PNV) maps covering more than 26,000 square miles within the region. The purpose of PNV maps is to serve as blueprints for restoration planning and prioritization. Due to the fact that the hydrology of the landscape has been permanently changed by major flood control projects, the PNV maps do not represent the distribution of the original, pre-settlement vegetation. Rather, they identify the natural communities that are appropriate to the modern altered site conditions. By using these maps, persons interested in restoring particular tracts of land can identify the plant communities appropriate to the conditions present. Conversely, individuals interested in restoring particular plant communities can identify parts of the landscape that can support each respective type. The PNV maps are available for use in a Geographic Information System, where a range of complex restoration scenarios (such as the development of wildlife travel corridors or refuge areas) can be explored efficiently, and alternative approaches can be compared to one another in terms of costs and ecological effectiveness. This report is one of six Field Atlases that present the same data in a downloadable, printable format at a scale of 1 in. = 1 mile.

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Preface

The Mississippi Alluvial Valley (MAV) once contained the most extensive and diverse lowland forest in North America. The complexity and productivity of the ecosystem were the result of the dynamic behavior of the large rivers that have repeatedly migrated across the landscape, eroding and depositing sediments and periodically flooding millions of acres. Since the arrival of the first European settlers in the 19th century, the rivers have been stabilized and prevented from inundating most of the former floodplain, and agriculture has largely replaced the native vegetation. The deforestation of the MAV has been recognized for more than half a century as contributing to a variety of problems such as the extinction of wildlife species and pollution of receiving waters, including the Gulf of Mexico. Various government policies and private initiatives have been implemented to reverse this damage through restoration of native plant communities.

Ecologists working to restore natural systems in the MAV have sought to understand the fundamental changes that have occurred, particularly with regard to hydrology, and evaluate the effects of these changes on ecosystem function and restorability. The state of Arkansas, with funding from the U.S. Environmental Protection Agency (EPA), initiated much of the research in this area as part of a program to develop guidebooks for hydrogeomorphic (HGM) classification and assessment of wetlands. Various Corps of Engineers offices also participated in HGM-related studies as part of impact and alternatives analyses conducted for proposed federal flood control and water development projects in the MAV. The field data and spatial information developed for some of the projects in Arkansas provided the basis for the initial Potential Natural Vegetation (PNV) maps that were intended to be used to guide restoration planning over large areas. Since then, PNV maps have been developed for all of the MAV in eastern Arkansas, northwestern Mississippi, and northeastern Louisiana, with funding from diverse sources, including Corps of Engineers District offices, EPA, the state of Arkansas, and the U.S. Fish and Wildlife Service.

PNV maps were originally intended to be used in a geographic information system (GIS), where numerous possible options for restoration design can be explored and evaluated. However, as part of their PNV efforts, the Fish and Wildlife Service also produced the first two Field Atlases–for Louisiana

and Mississippi—and made the PNV maps available as downloadable products intended to be printed and bound for field use (http://www.lmvjv.org/bookshelf.htm). This format proved popular, so a set of four additional atlases covering the Arkansas portion of the MAV has been developed, the current atlas being one of them. All four of these documents are available for download at: http://el.erdc.usace.army.mil/emrrp/analyt.html

Charles Klimas, U.S. Army Engineer Research and Development Center (ERDC), Thomas Foti (Arkansas Natural Heritage Commission and Oakleaf Institute, Little Rock, Arkansas) and Jody Pagan (5-Oaks Wildlife Services, LLC, Stuttgart, Arkansas) developed the PNV concept and approach and have been the core mapping team across all of the basins. The original PNV maps upon which this atlas is based were developed for the Memphis District, Corps of Engineers, with the assistance of the State of Arkansas' Multiagency Wetland Planning Team, as part of the Bayou Meto Flood Control Project (Klimas et al. 2004). Michael Bishop (ERDC) assembled and processed the original project GIS data, and Malcolm Williamson (Center for Advanced Spatial Technologies, University of Arkansas, Fayetteville) updated and normalized that GIS data and prepared the maps that are included in this atlas.

While various sponsors participated in the development of the original maps, as described above, this series of Arkansas PNV Atlases was prepared and published under the Ecosystem Management and Restoration Research Program (EMRRP), within the Environmental Laboratory, ERDC, Vicksburg, Mississippi. Glenn Rhett is EMRRP Program Manager. Dr. Al Cofrancesco is the ERDC Technical Director for the EMRRP.

COL Kevin J. Wilson is the Commander of ERDC, and Dr. Jeffery P. Holland is the Director.

Unit Conversion Factors

Multiply	By	To Obtain
acres	4,046.873	square meters
inches	0.0254	meters
miles (U.S. statute)	1,609.347	meters
square miles	2.589998 E+06	square meters

1 Introduction

Studies of wetland plant communities in the Mississippi Alluvial Valley (MAV) over the past decade have produced a site classification approach based on hydrology and geomorphic setting. The approach is consistent with the "hydrogeomorphic" or HGM wetland classification system, but it has been adapted and refined specifically to support the development of detailed maps of the Potential Natural Vegetation (PNV) of the region. PNV maps serve as a template for restoration planning and prioritization in a landscape that has been highly modified. Most of the bottomland hardwood forests and other native plant communities of the MAV were converted to agriculture during the 20th century. The remnants are largely those forest types that are adapted to the wettest sites where row cropping was infeasible. At the same time, tremendous local and federal effort has been expended on drainage, flood control, and navigation projects that have permanently altered the hydrology of the floodplain and alluvial terraces in the region. Consequently, the PNV maps are not designed to represent the distribution of the original, pre-settlement vegetation; rather, they identify the natural communities that are appropriate to the altered site conditions, hence the "potential" designation. This means that persons interested in restoring particular tracts of land can identify the plant communities appropriate to the various site conditions present. Conversely, individuals interested in restoring particular plant communities can identify parts of the landscape that could support each respective type. This information is available in GIS format, so various restoration scenarios can be explored and compared in terms of relative costs and ecological effectiveness.

This atlas covers the Bayou Meto Basin, in east-central Arkansas. It has been created as a field reference for professionals who plan and conduct restoration projects in that area. The maps in this atlas (Appendix A) are produced at a scale of approximately 1:63,360 (1 in. = 1 mile). As an aid to orientation in the field, each PNV map is accompanied by the corresponding aerial image on the facing page, and both pages display major roads and towns. The pages immediately preceding the maps include master indexes to the map pages, using two different basemaps to provide an overview of the mapped PNV types as well as roads and towns for orientation. Also preceding the map section is a map key that lists all of the PNV vegetation community types present in the basin as well as the community

classification code, typical site conditions, and common dominant species for each type. Appendix B follows with details on the characteristics of each community type; these details provide guidance regarding natural topographic features and plant species appropriate for restoration. The PNV approach, mapping criteria, and typical applications are described in more detail in a separate publication (Klimas et al. 2009).

2 The Bayou Meto Basin

The Bayou Meto Basin drains most of the MAV lowlands immediately north and east of the Arkansas River as well as part of the Grand Prairie (Figure 1). Bayou Meto and Bayou Two Prairie are the only major streams in the basin. The Bayou Meto Basin is the smallest of the four major basins in the Delta Region of Arkansas, comprising approximately 827,000 acres.

Figure 1. Location of the Bayou Meto Basin in Arkansas.

There are three distinct geomorphic surfaces within the Bayou Meto Basin, although all are products of the Arkansas River and all are composed of features typical of meandering rivers, such as point bar, backswamp, natural levee, and abandoned channel deposits. The lowest and most recent surface is sometimes called the Arkansas Lowlands. It is made up of Holocene deposits of the Arkansas River, and prior to construction of the modern levee system along that river, the entire area was subject to frequent flooding. Immediately to the west of Stuttgart, on the northern perimeter of the Arkansas Lowland, is a former floodplain area that is now somewhat elevated above the modern floodplain. This is the Deweyville Terrace, which formed in the Late Pleistocene during a dramatically different climatic period when the flow of the Arkansas River was much greater than it is today. As a result, the remnant abandoned channel segments on that terrace–oxbow lakes and depressions–are larger than the same types of features found on either younger or older sites in the region. Still higher in the landscape is the Grand Prairie, a remnant of the Arkansas River floodplain that existed much earlier in the Pleistocene. Erosion has muted the meander belt features on that terrace, and streams transitioning down to the lowlands have cut small valleys into the escarpment, effectively draining the perimeter of the terrace. Much of the rest of the area remains flat and the poorly drained alluvial soils pond sufficient precipitation to support wetland forests and prairie.

3 Using the PNV Map as a Model for Restoration

The PNV mapping process was conceived as a way to provide the best available representation of restoration potential for the native plant communities of the MAV. One key aspect of these maps is that they reflect current, rather than historic, hydrologic patterns. This fundamental feature of the classification system—basing community designations on site conditions rather than species composition—also prevents misclassification of sites based on past management practices or other historic influences. The map legend (Appendix A) includes several ways of classifying the community types: by HGM subclass, for use with the corresponding HGM functional assessment guidebook (Klimas et al. 2011); by site characteristics, which can be used to help guide site preparation; and by species dominance type, which lists species that frequently dominate on similar sites throughout the MAV. Note that these dominant species are not the only ones that should be included in a restoration plan for a site, and that sometimes one or more of the listed species are not common on a site type within a specific basin. Restoration planning should be based on the detailed and basin-specific community type descriptions in Appendix B. These descriptions reflect the probable long-term dominance patterns under current conditions. Forested sites will sometimes include species other than those that presently dominate. As a consequence of these characteristics, there are many possible uses for the PNV maps, including those listed below.

Replacement of critical habitat

The PNV mapping effort in Louisiana was initiated specifically to support restoration of potential habitat for the Ivory-Billed Woodpecker, which was prompted by its recent reported rediscovery in Arkansas. Foti et al. (2011) discuss how PNV mapping can be used to help guide a restoration program of that type in the modern MAV landscape. Where critical habitat for other species is dependent on the composition, structure, and distribution of plant communities, the PNV maps can be used in similar ways to target the most effective sites for habitat restoration and population management.

Site-specific restoration design

Because the PNV maps often recognize mapping units of a fraction of an acre, they can normally inform restoration design even on relatively small or diverse sites. The site characteristics and geomorphic settings described in Appendix B indicate the extent to which a particular community tends to be affiliated with the ridges or swales of point bars, or the almost-imperceptible vernal pools in backswamps, and similar subtle variations in topography that may have been moderated or eliminated by agricultural practices. Users should evaluate a particular site in light of these descriptions, and restore the appropriate topography prior to planting the area. If filling a ditch or breaking a levee is part of the restoration plan, the expected change in flood frequency will indicate establishment of a plant community different from the mapped unit, and that new "target" condition can be identified by consulting Appendix B. While all of these features will help guide restoration design, users are encouraged to adjust their site preparation and planting plans as needed based on their local knowledge, experience, and observations of actual conditions in the field. In particular, it is important to recognize that the accuracy of the community boundaries on the PNV map are limited by the precision and resolution of the underlying geomorphic, soils, and hydrology mapping, and that transitions between vegetation communities are normally more gradual than the distinct polygons on such maps imply. Similarly, where the modern hydrology is affected by structures such as roads and aquaculture impoundments, community boundaries may appear as straight lines. The authors have attempted to estimate the approximate true boundary if the structure is one that can be easily removed as part of a restoration project (e.g., a low catfish pond levee) but did not modify linear boundaries where the structure is unlikely to be removed (roads and flood-control levees) or where the topography, geomorphology, and soil data did not indicate a probable community transition location. In such cases the mapped feature appears as a rectangle and users should evaluate such modified sites individually prior to developing restoration specifications.

Landscape-level restoration planning

PNV maps can be useful for identifying restoration needs and opportunities where resource objectives involve the distribution of particular habitats over large regions. For example, in a GIS environment, it is relatively simple to identify sites appropriate for the restoration of extremely rare communities (e.g., prairies); sites that would support the maximum habitat diversity within a single large block of restored forest; or the forest communities

appropriate for restoration within various sections of a lengthy riparian corridor. PNV maps directly reflect flood frequency; therefore, restoration projects can be designed to assure that flood refuge areas are included in projects intended to provide habitat for terrestrial wildlife. Because the PNV maps use the HGM classification system, they reflect other wetland characteristics of potential interest. For example, the PNV map distinguishes between sites suitable for establishing Connected Depressions and Unconnected Depressions. Though these sites support the same forest communities, the latter is far more suitable for restoring amphibian populations due to the lack of predatory fish. There are numerous similar types of applications that can add flexibility and insight to the restoration planning process.

Mitigation design

The PNV maps have several obvious regulatory and planning applications. They can be used to find suitable locations for in-kind mitigation of project impacts, or to plan mitigation in a watershed context, as is currently encouraged in various federal programs. However, because the PNV maps use the HGM classification system, they can also be used in conjunction with HGM Regional Guidebooks to help calculate the appropriate amount of compensatory mitigation for particular wetland subclasses under various impact scenarios. The HGM guidebook for the Arkansas Delta Region (Klimas et al. 2011) includes assessment models and recovery trajectories that can be used to estimate the degree to which restored wetlands perform certain functions over time. This means that restoration priorities can be adjusted to offset the loss of particular functions, or to favor restoration scenarios that will most quickly meet particular functional needs.

This atlas and other files and documents related to Potential Natural Vegetation mapping in the Mississippi Alluvial Valley can be downloaded from: http://el.erdc.usace.army.mil/emrrp/analyt.html

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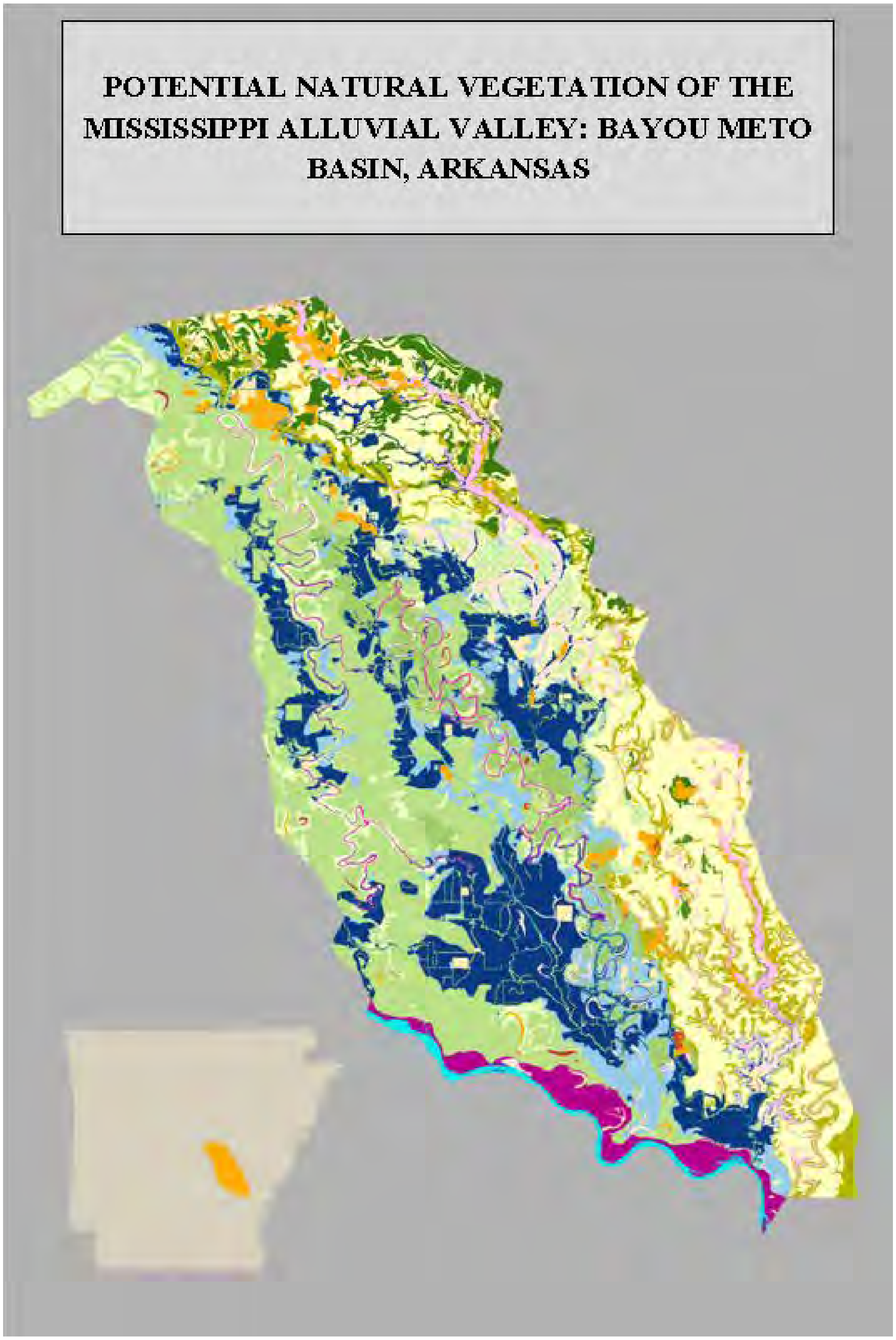
Appendix A: Field Atlas



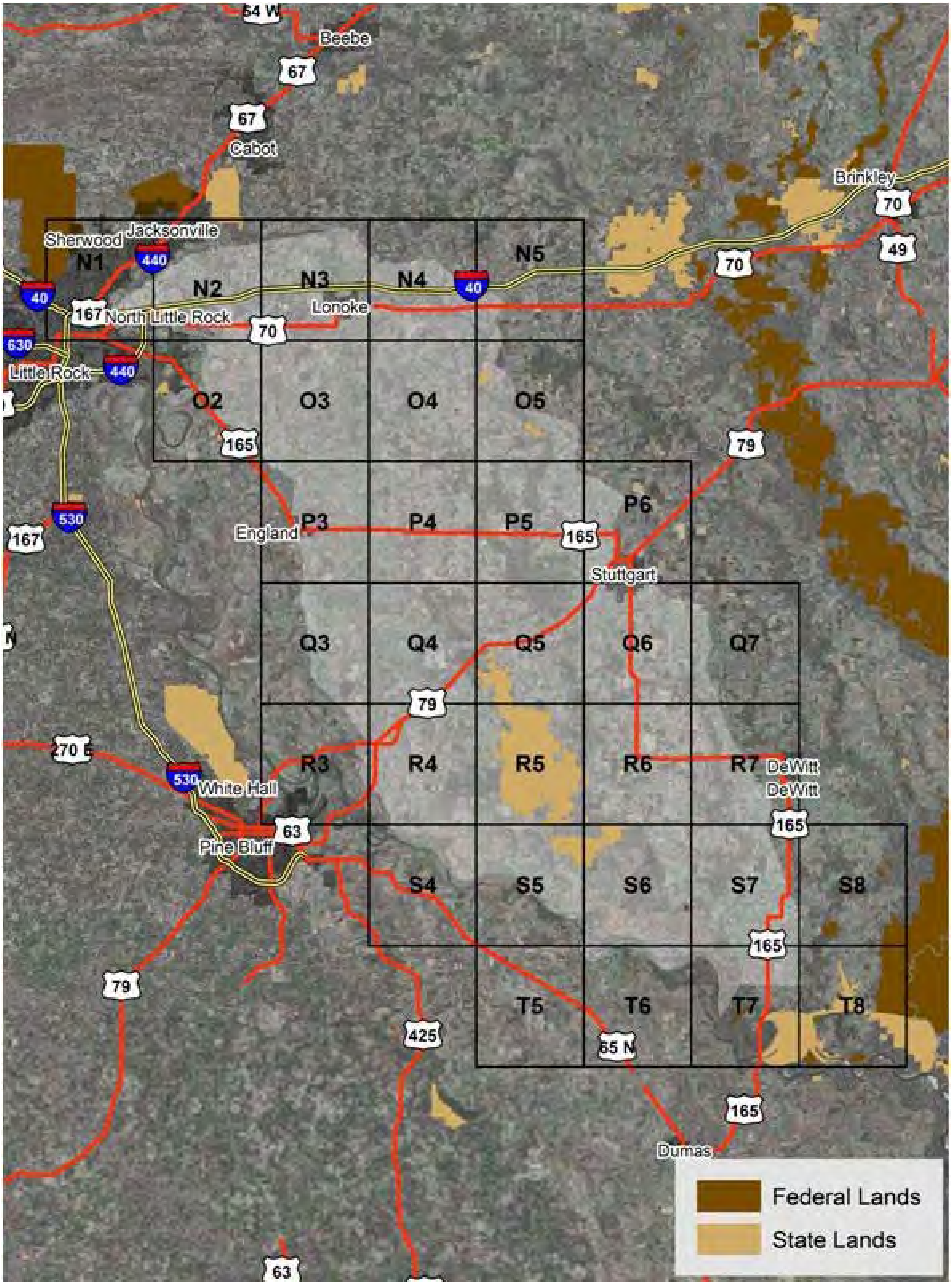


Figure A1. Bayou Meto Basin Map Index: Cities, Roads, and Public Lands.

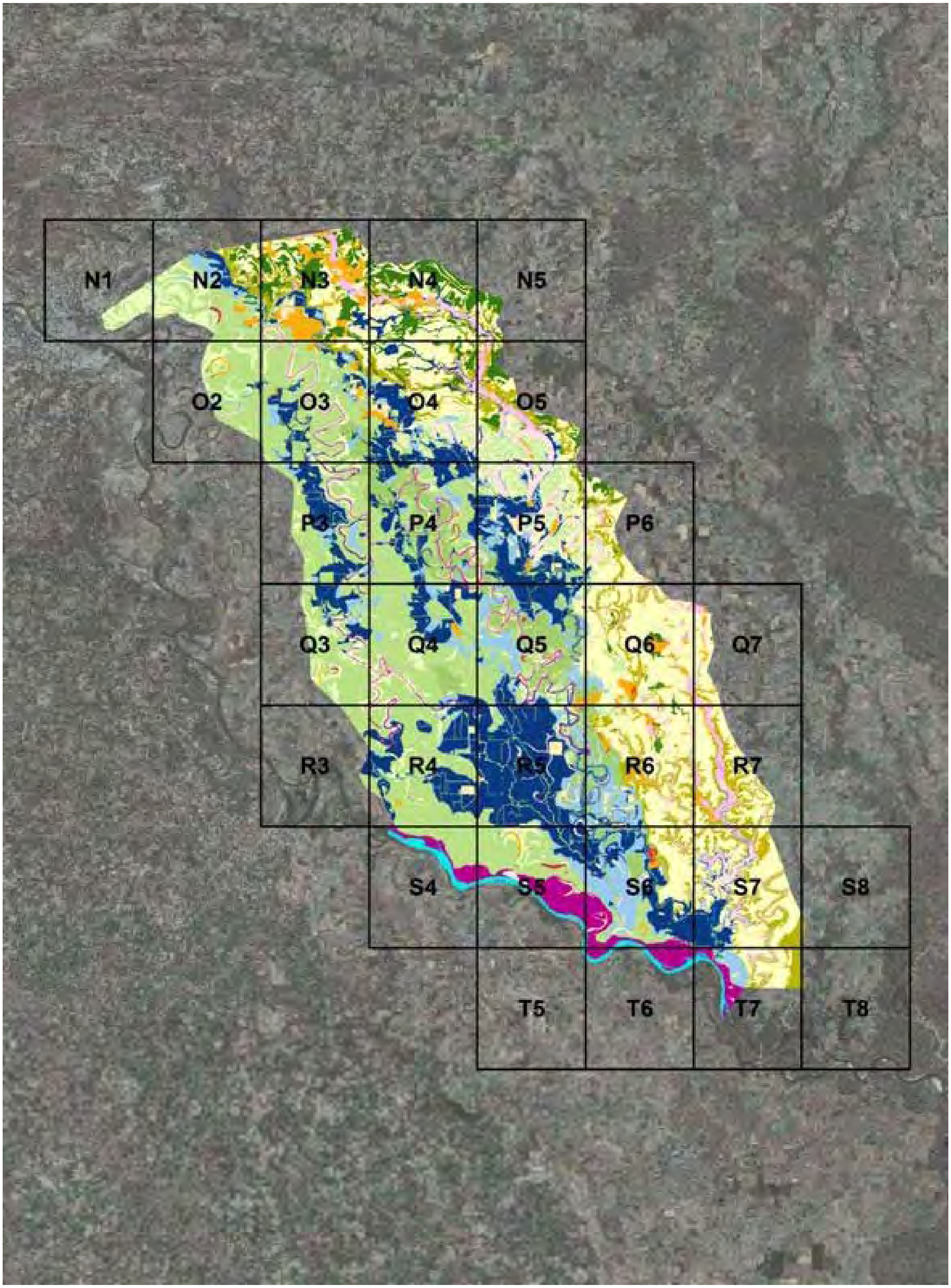
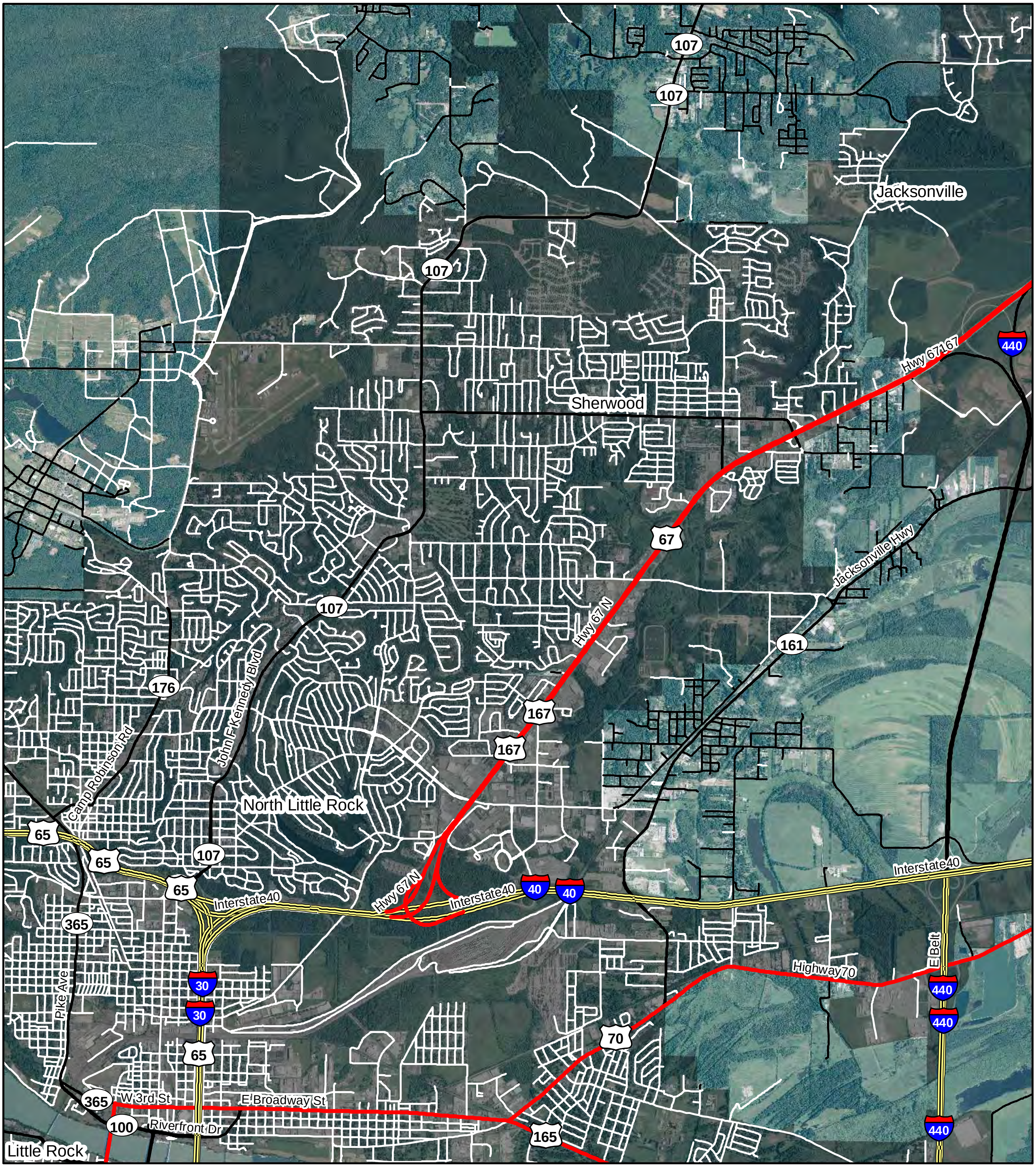


Figure A2. Bayou Meto Basin Map Index: Potential Natural Vegetation.

POTENTIAL NATURAL VEGETATION MAP KEY, BAYOU METO BASIN, ARKANSAS		
HGM Subclass	**General Site Characteristics**	**Principal Dominant Species**
RIVERINE BACKWATER	**WETLANDS MAINTAINED BY RIVERINE BACKWATER FLOODING**	
RB2	Occasionally flooded, moderately-drained lowlands	Willow Oak–Water Oak
RB7	Frequently flooded lowlands	Overcup Oak–Bitter Pecan
RIVERINE OVERBANK	**WETLANDS MAINTAINED BY RIVERINE OVERBANK AND HEADWATER FLOODING**	
RO1	Floodplains and terraces of small stream valleys	Mixed Lowland Hardwoods
RO2	River swamps in underfit channels	Baldcypress–Water Tupelo
RO3	Riverfront natural levee and point bar	Cow Oak–Pecan–Cherrybark Oak–Cottonwood
FLAT	**WETLANDS MAINTAINED BY PRECIPITATION**	
F1	High natural levees	Cottonwood–Water Oak–Pecan
F2	Well-drained recent alluvium in lowlands	Cherrybark Oak–Water Oak–Sweetgum
F3	Well-drained older alluvium in lowlands	Cow Oak–Cherrybark Oak–Water Oak
F4	Moderately-drained lowlands	Sugarberry–Green Ash–American Elm
F8	Poorly-drained level topography on Pleistocene outwash terraces	Wet Prairie
F9	Flatwoods on poorly-drained sites of the Prairie Terrace	Delta Post Oak–Cherrybark Oak
F13	Hardwood flats, Early Wisconsin Valley Train and Deweyville Terraces (wet phase)	Delta Post Oak–Willow Oak
DEPRESSION	**WETLANDS IN DEPRESSIONS**	
D1	Stream-connected depressions in abandoned channels	Baldcypress–Water Tupelo
D3	Unconnected depressions in abandoned channels	Baldcypress–Water Tupelo
FRINGE	**WETLANDS FRINGING WATER BODIES**	
FR1	Stream-connected lake and pond fringe wetlands	Baldcypress–Buttonbush–Emergents
FR2	Unconnected lake and pond fringe wetlands	Baldcypress–Buttonbush–Emergents
UPLAND	**UPLANDS**	
U1	Shallow, droughty soils of the Pleistocene terraces	Prairie–Post Oak
U3	Upland forests of the Prairie Terrace	Mixed hardwood
WATER	**WATER**	
W	Permanent water bodies other than lakes and ponds (fringe)	Streams and major drainage ditches

Figure A3. Map legend.



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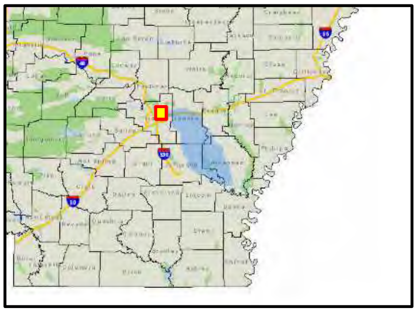

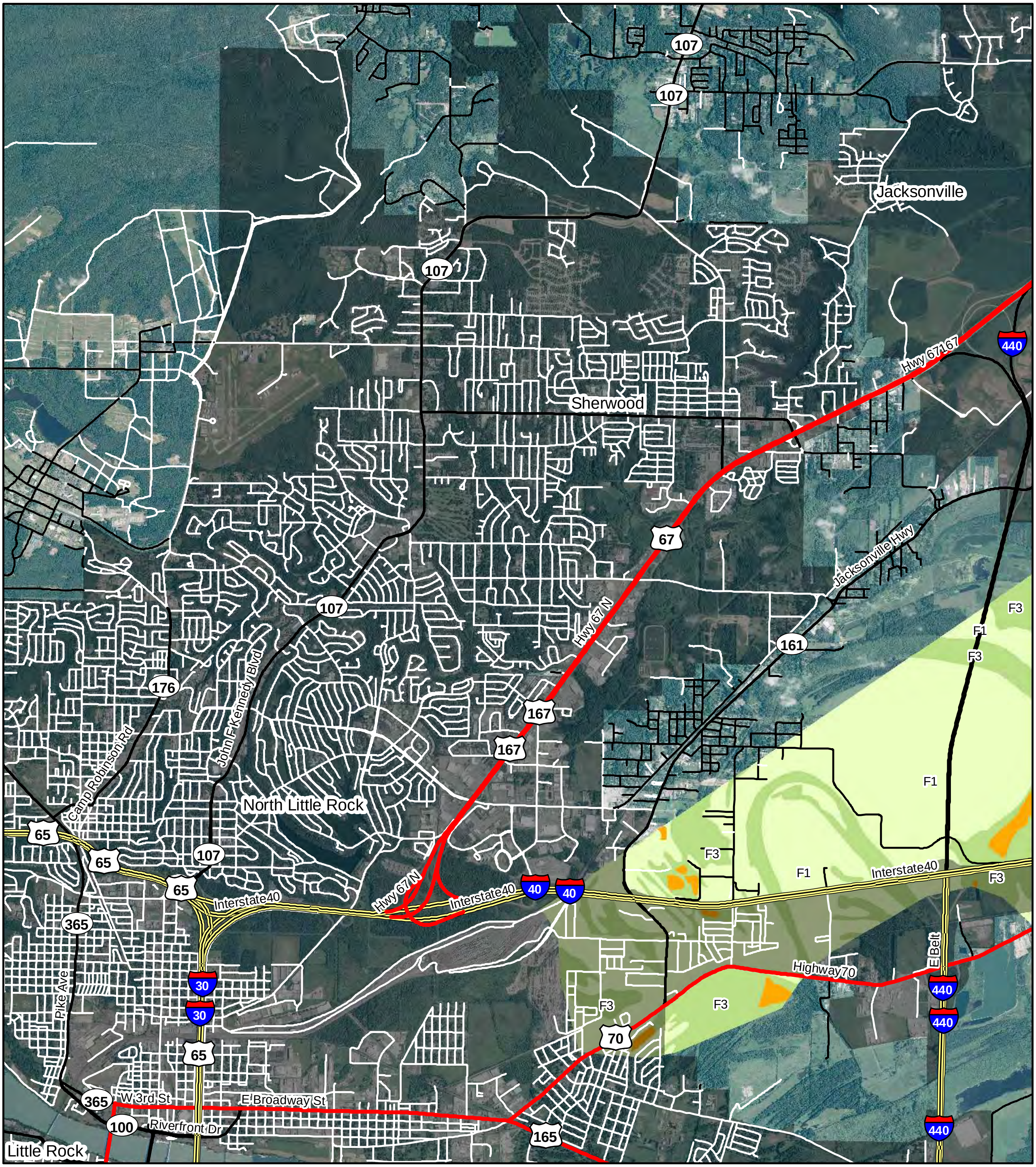

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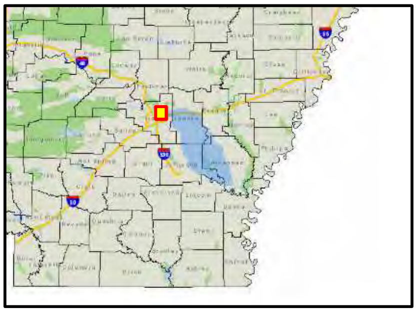

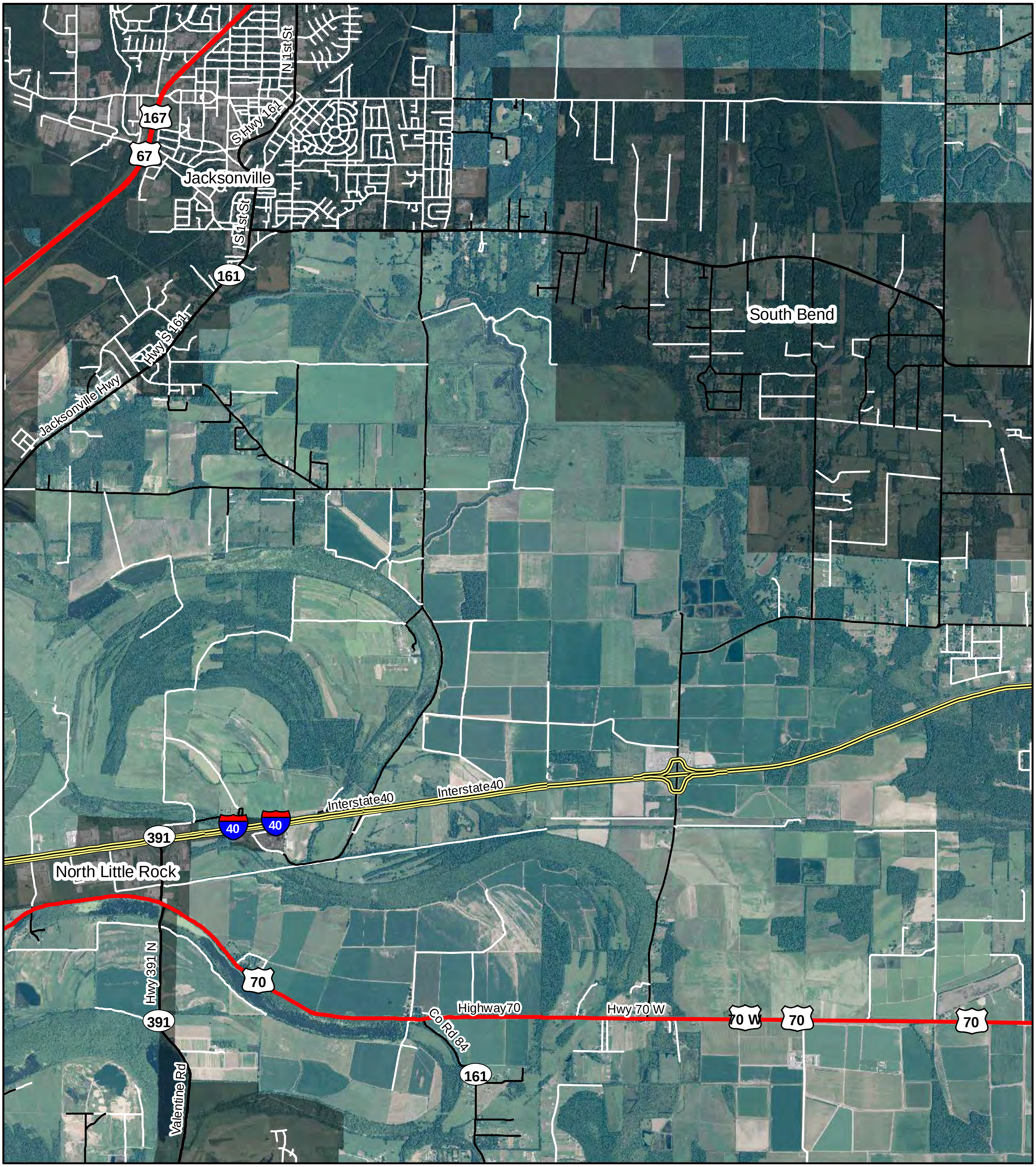

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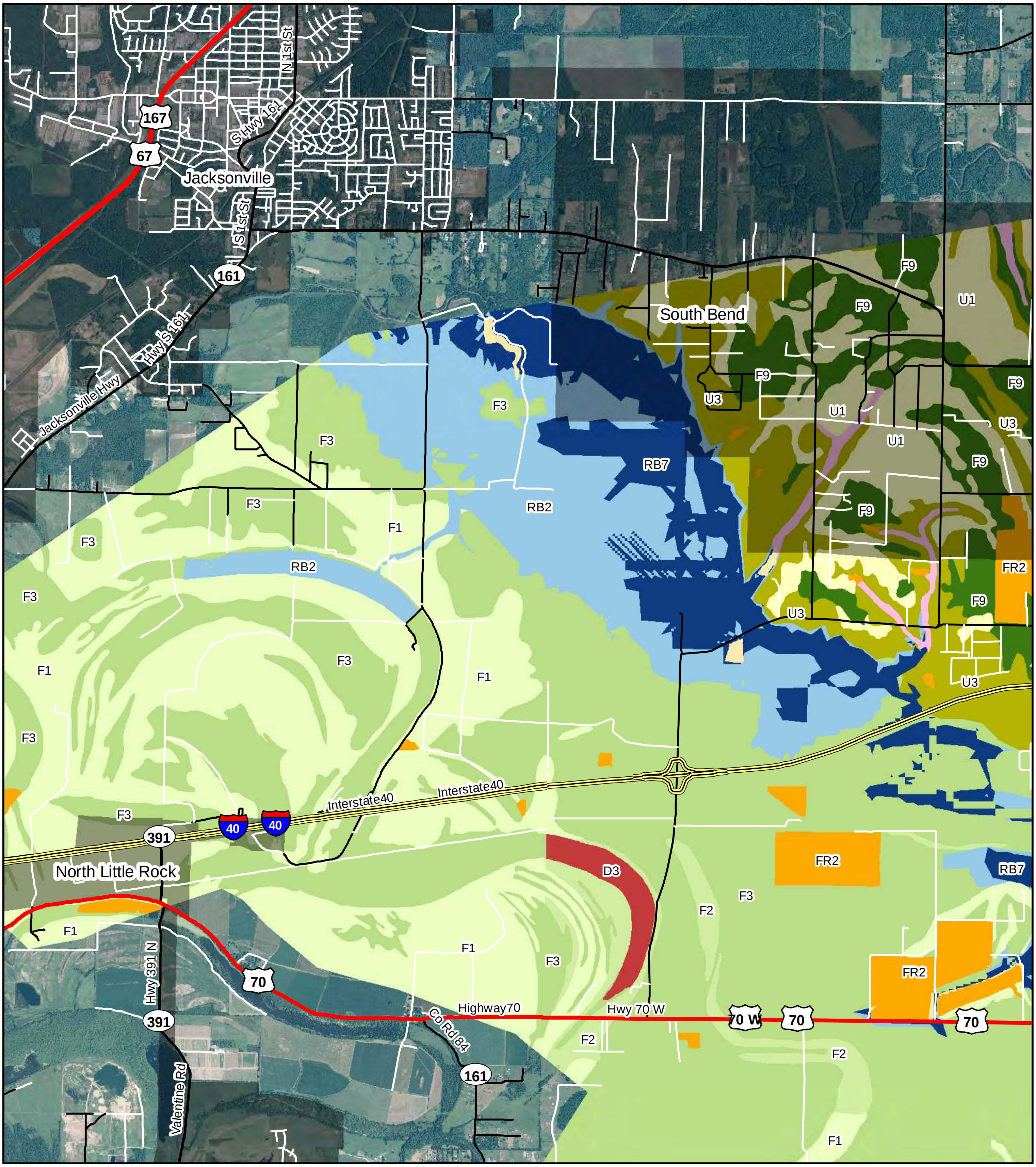

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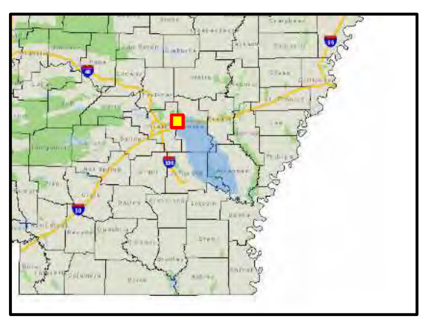

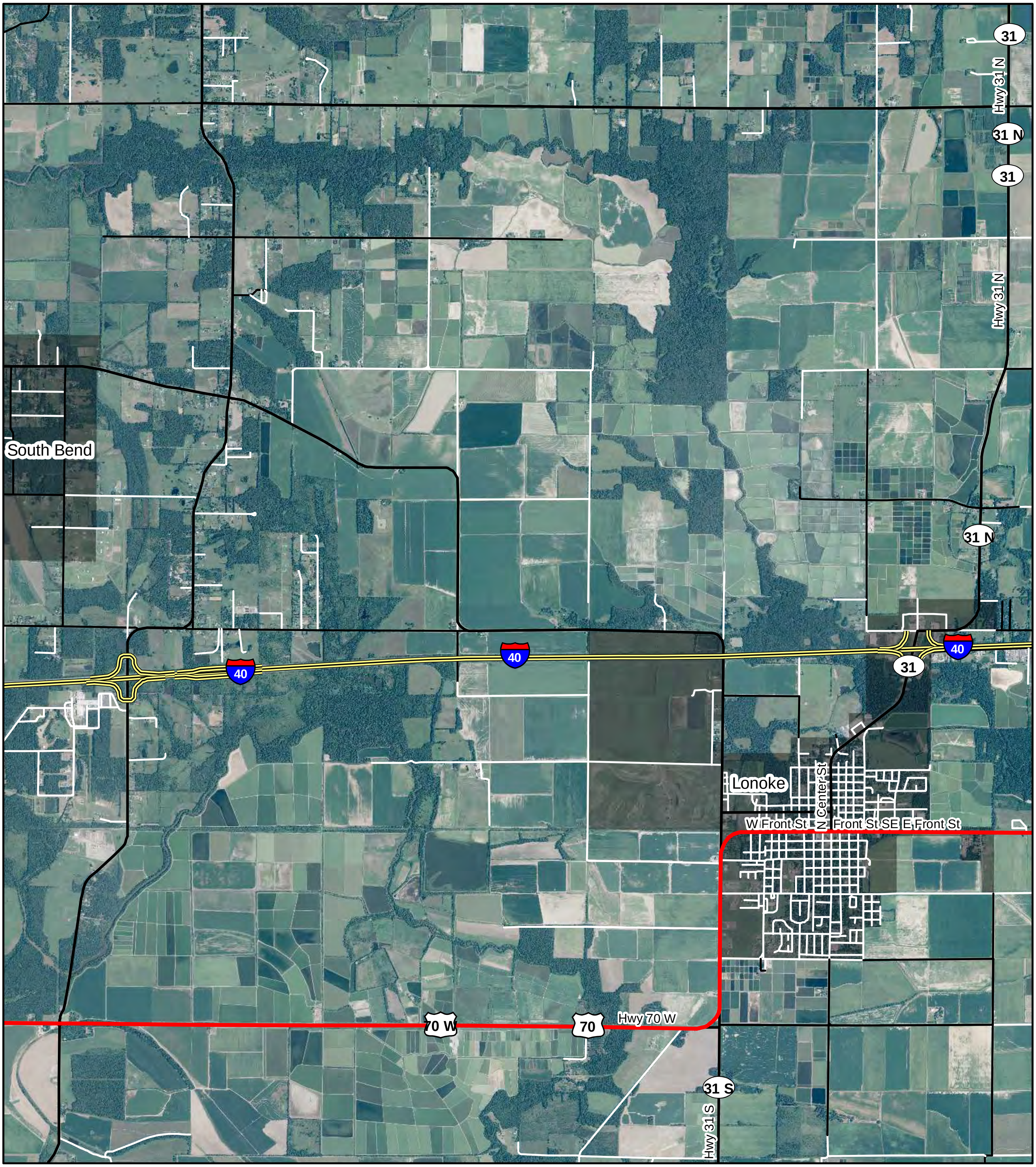

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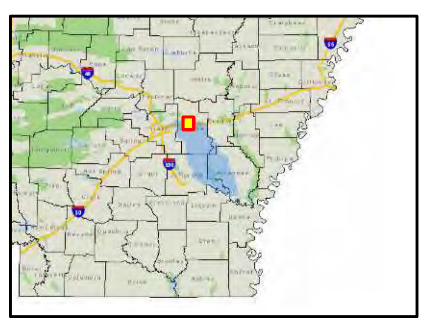

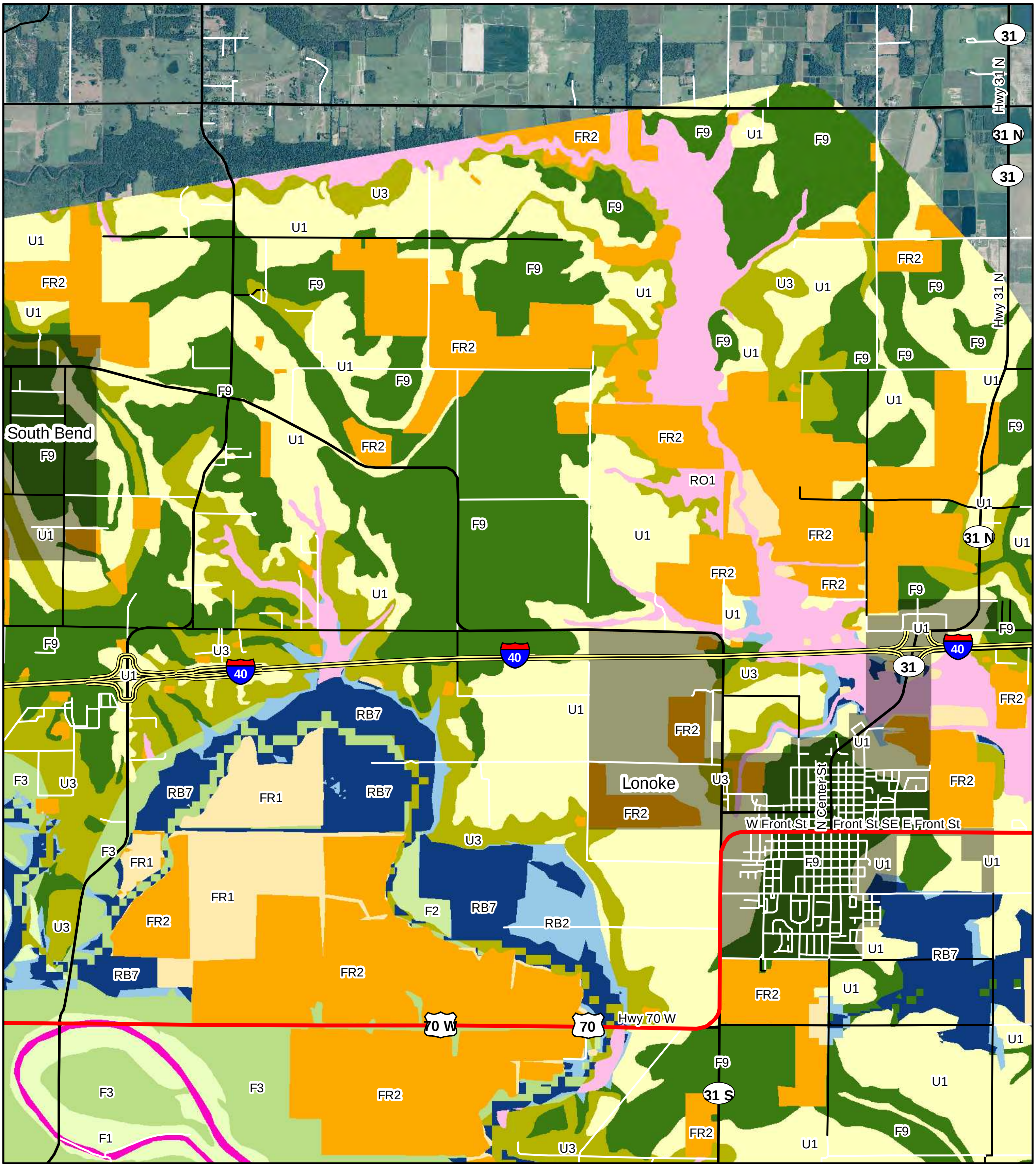

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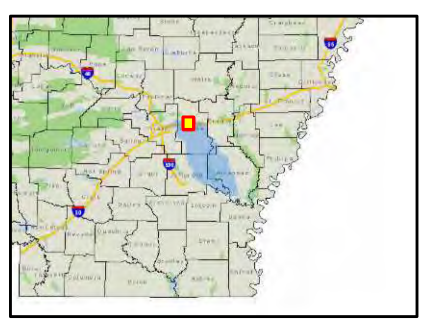

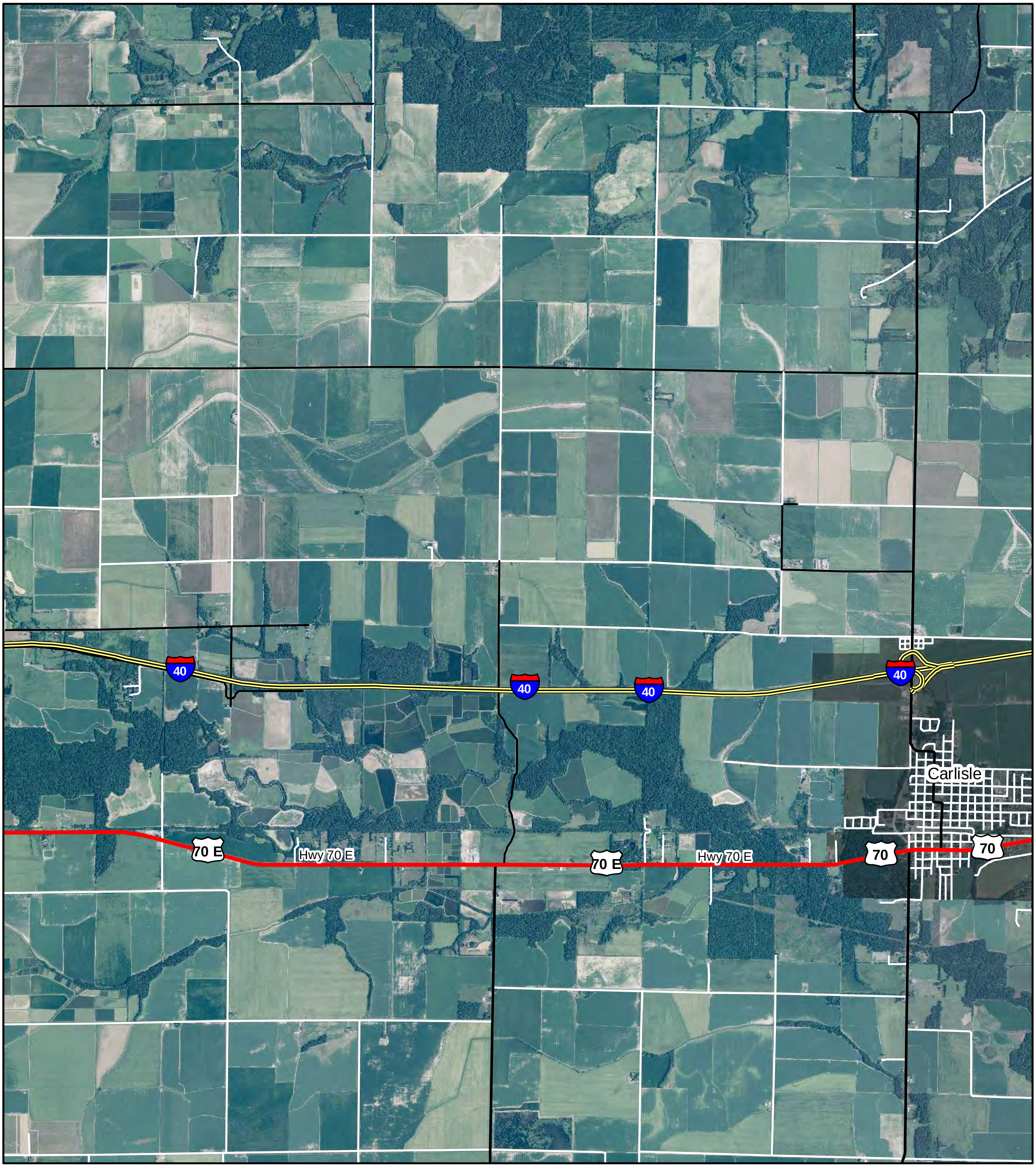

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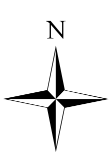

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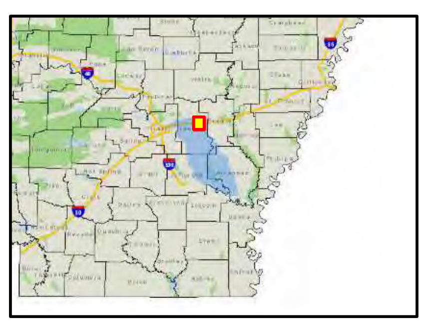

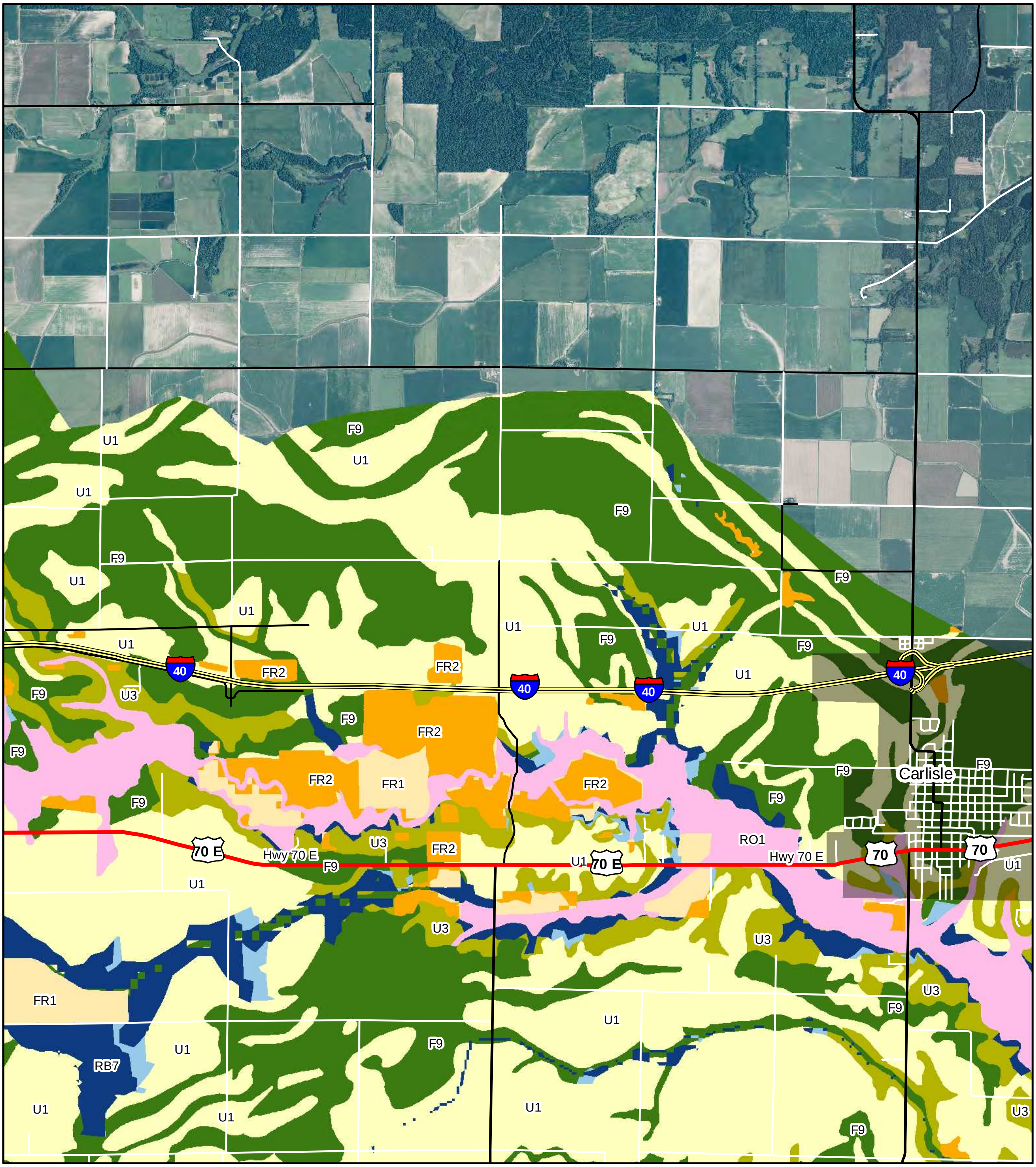

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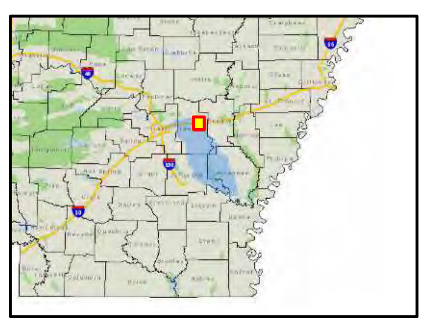

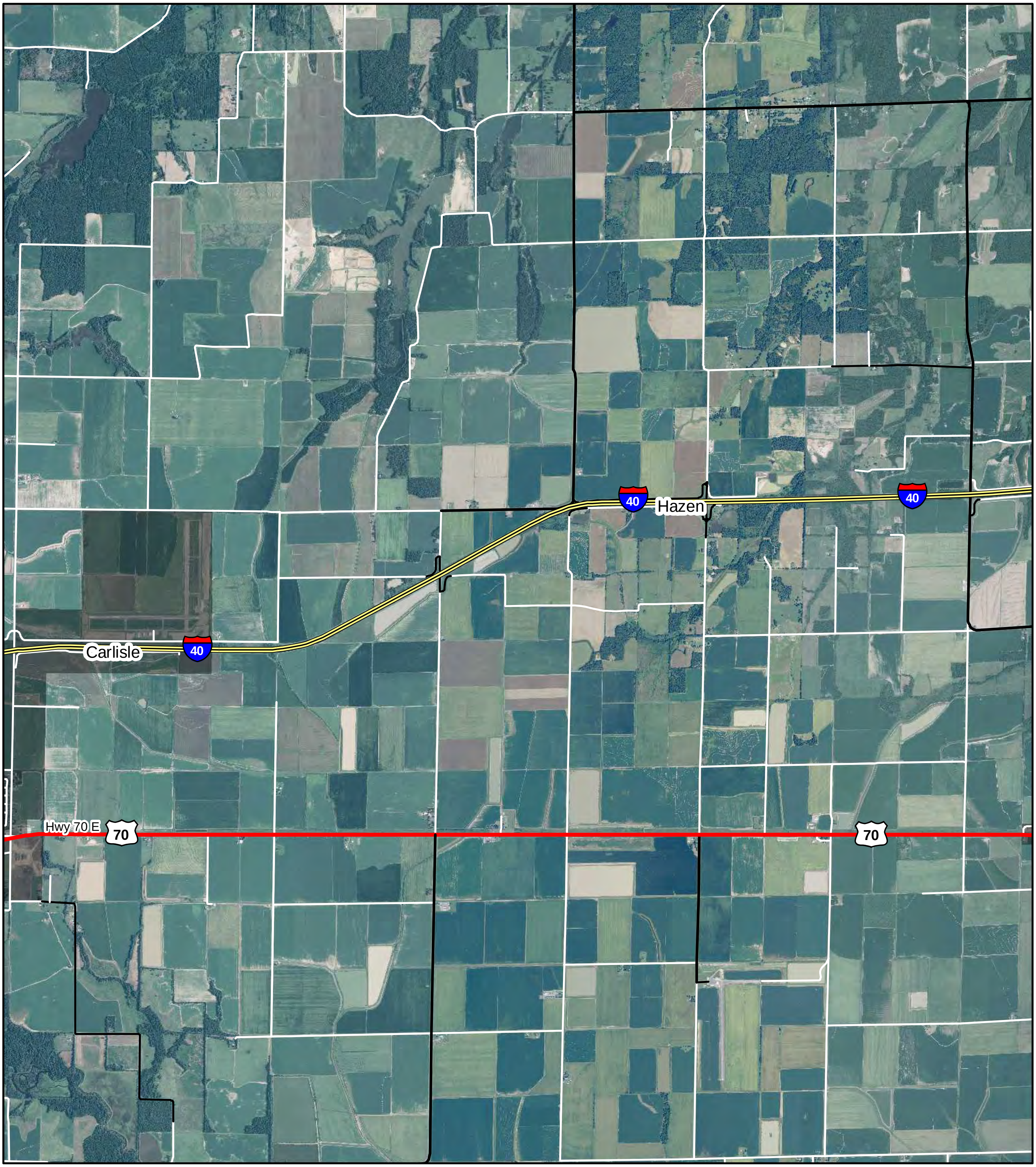

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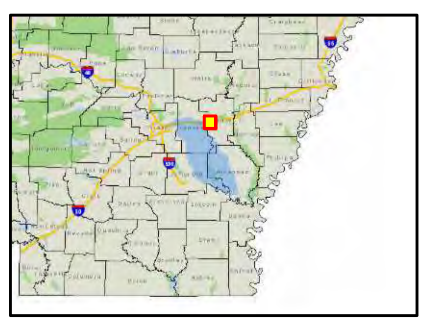

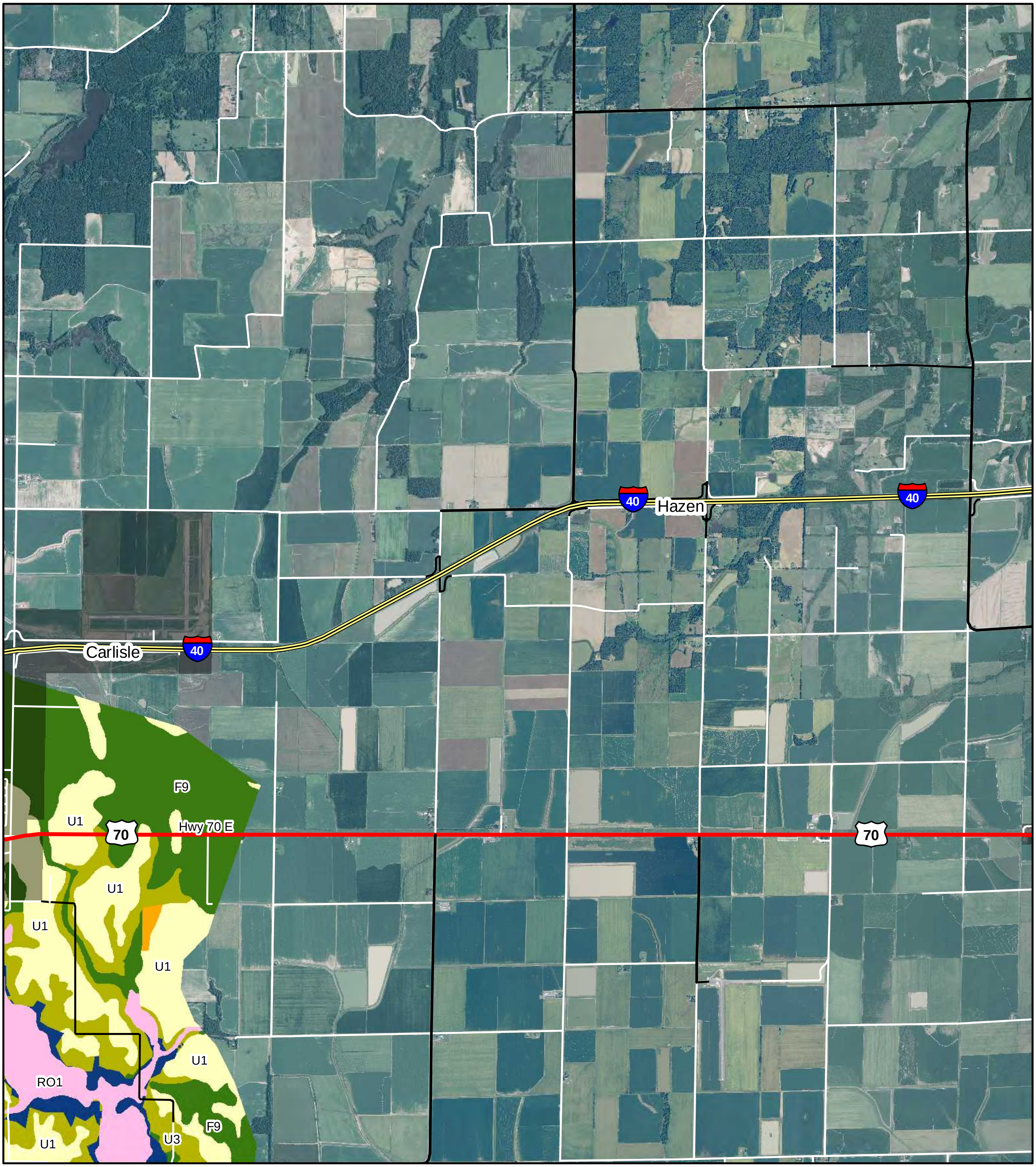

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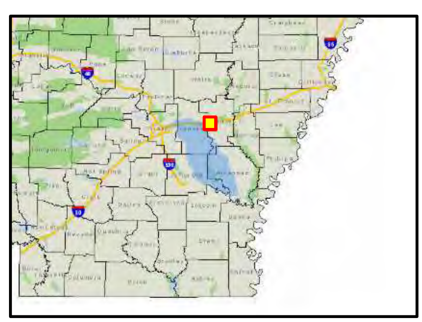

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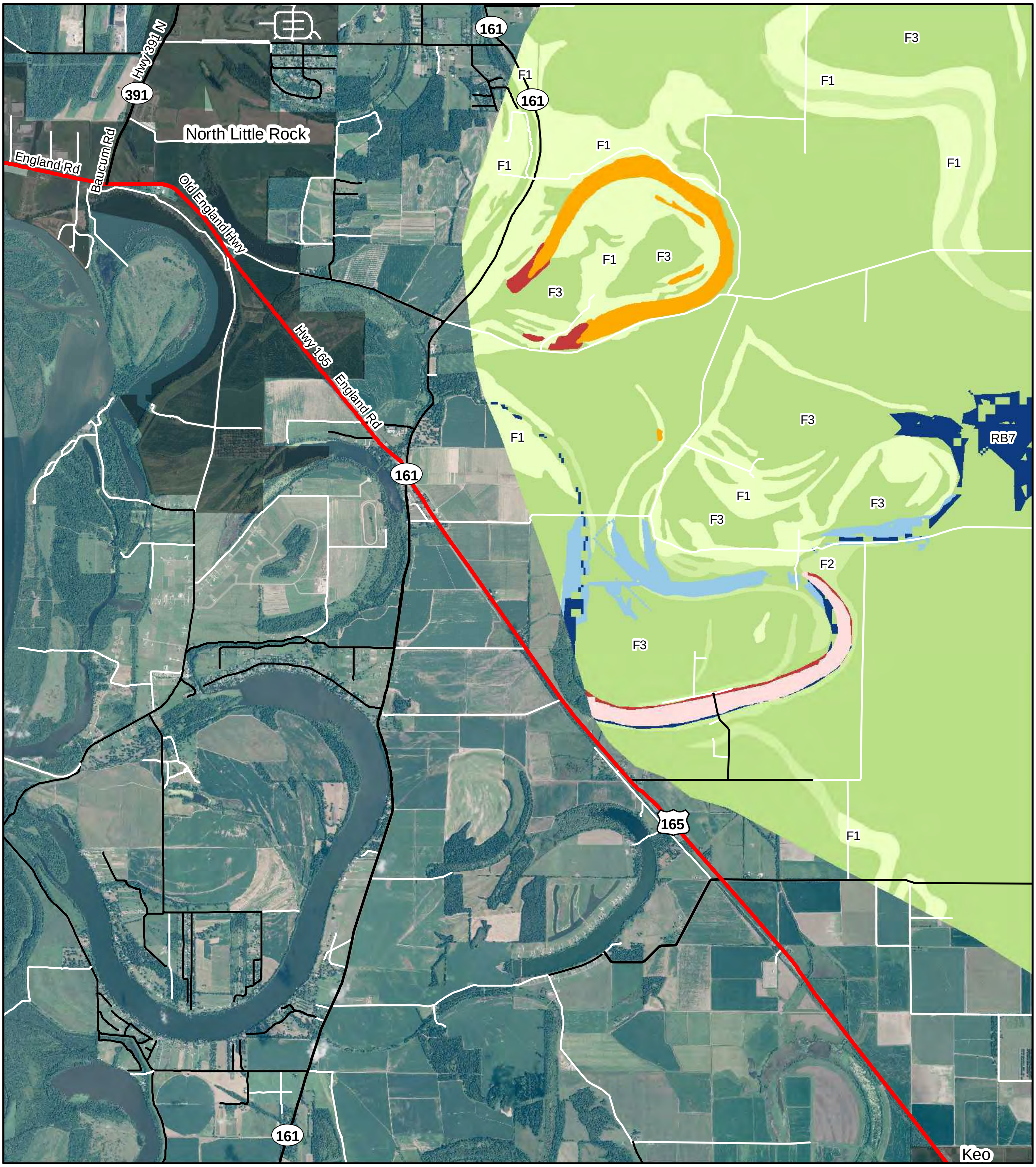

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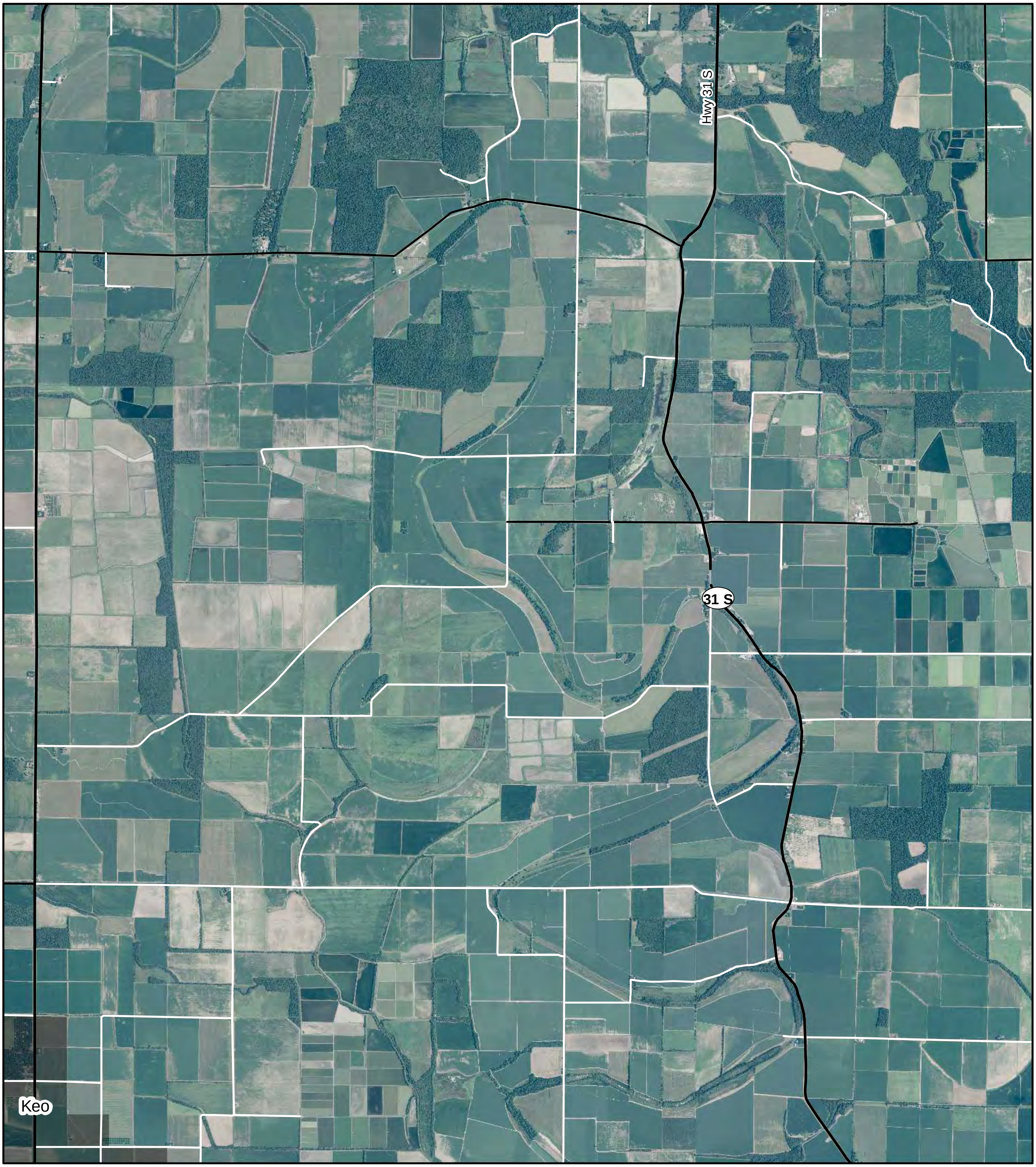

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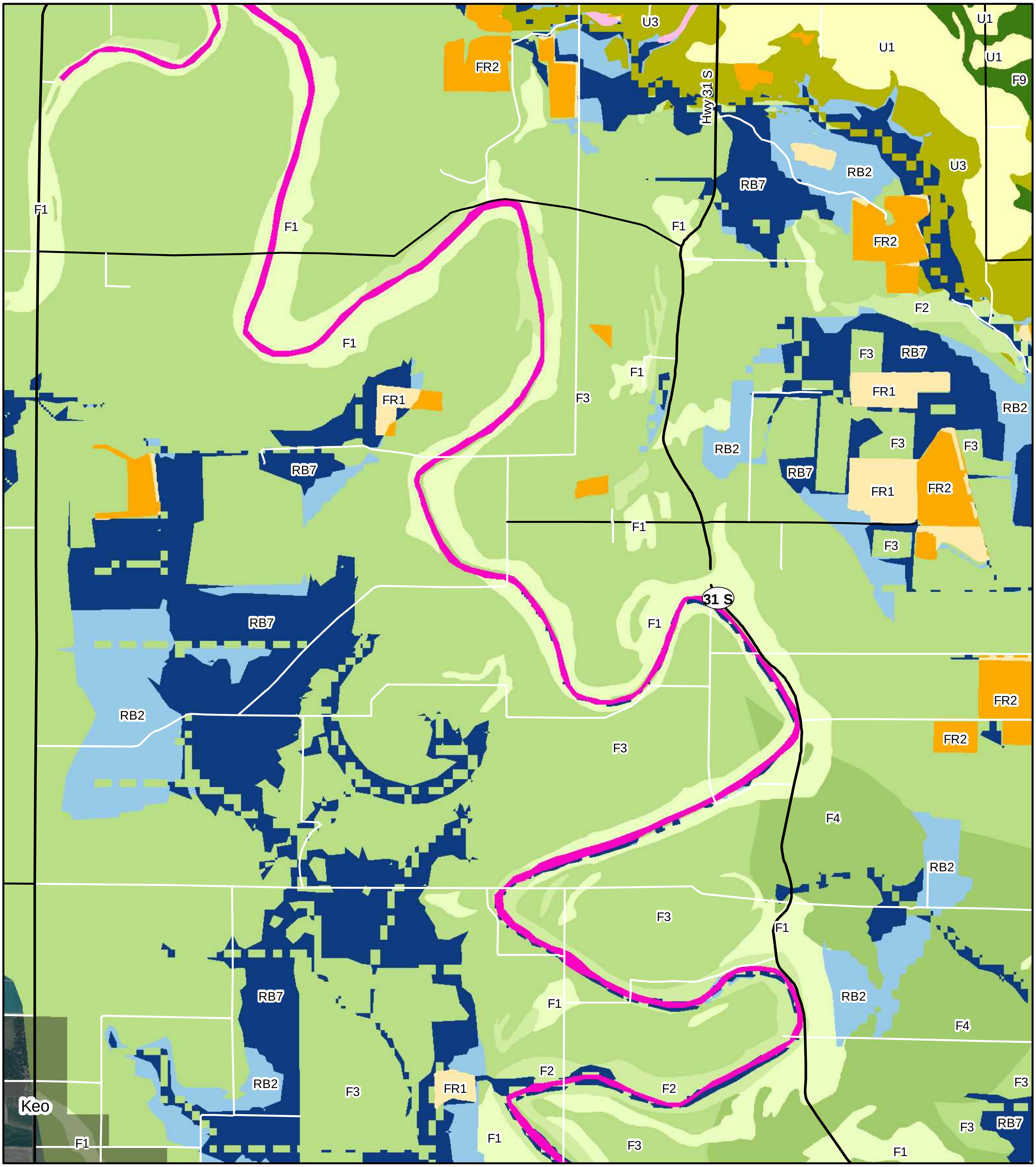
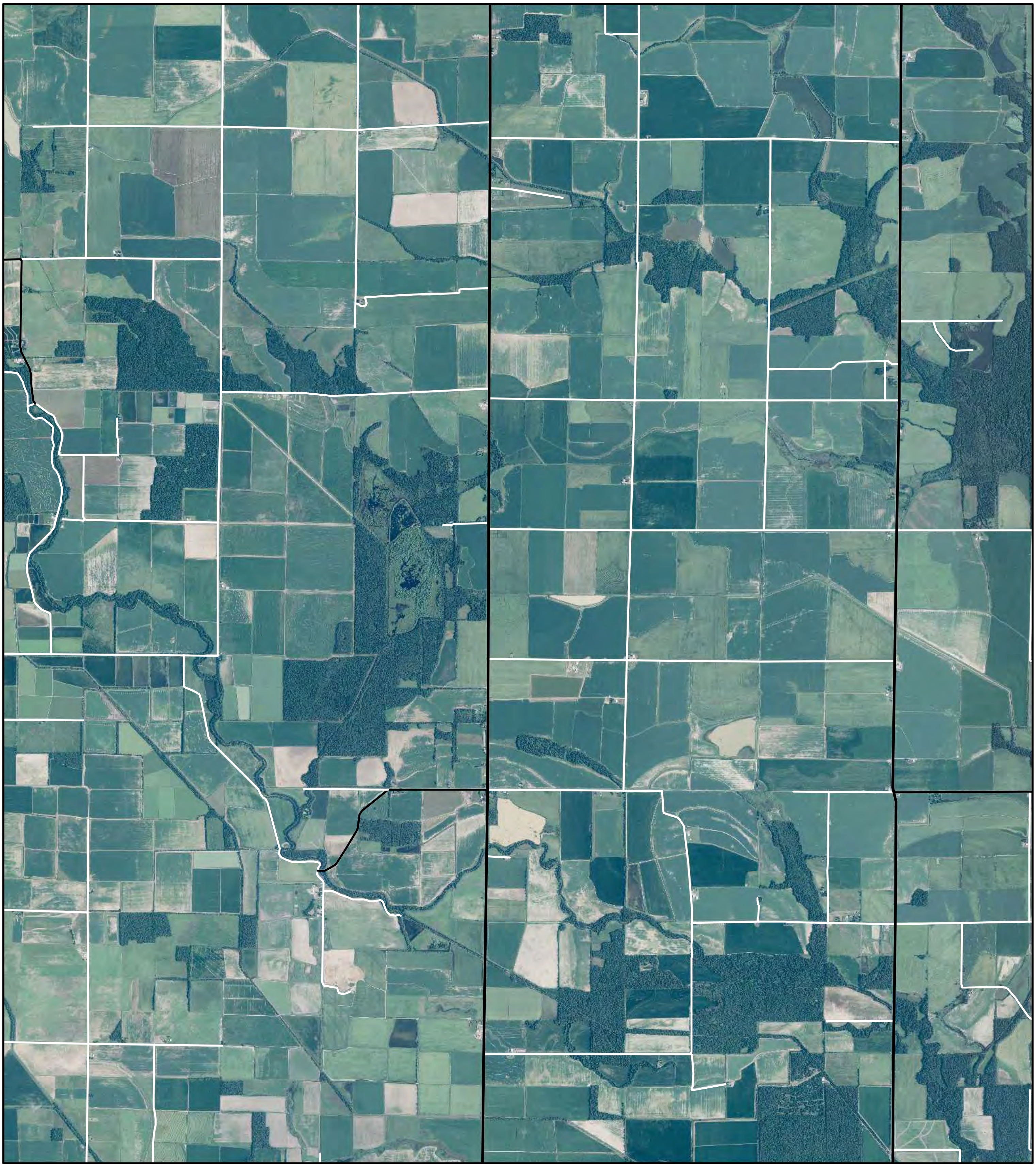


0 0.5 1 2 3 4 Miles

O3

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

N



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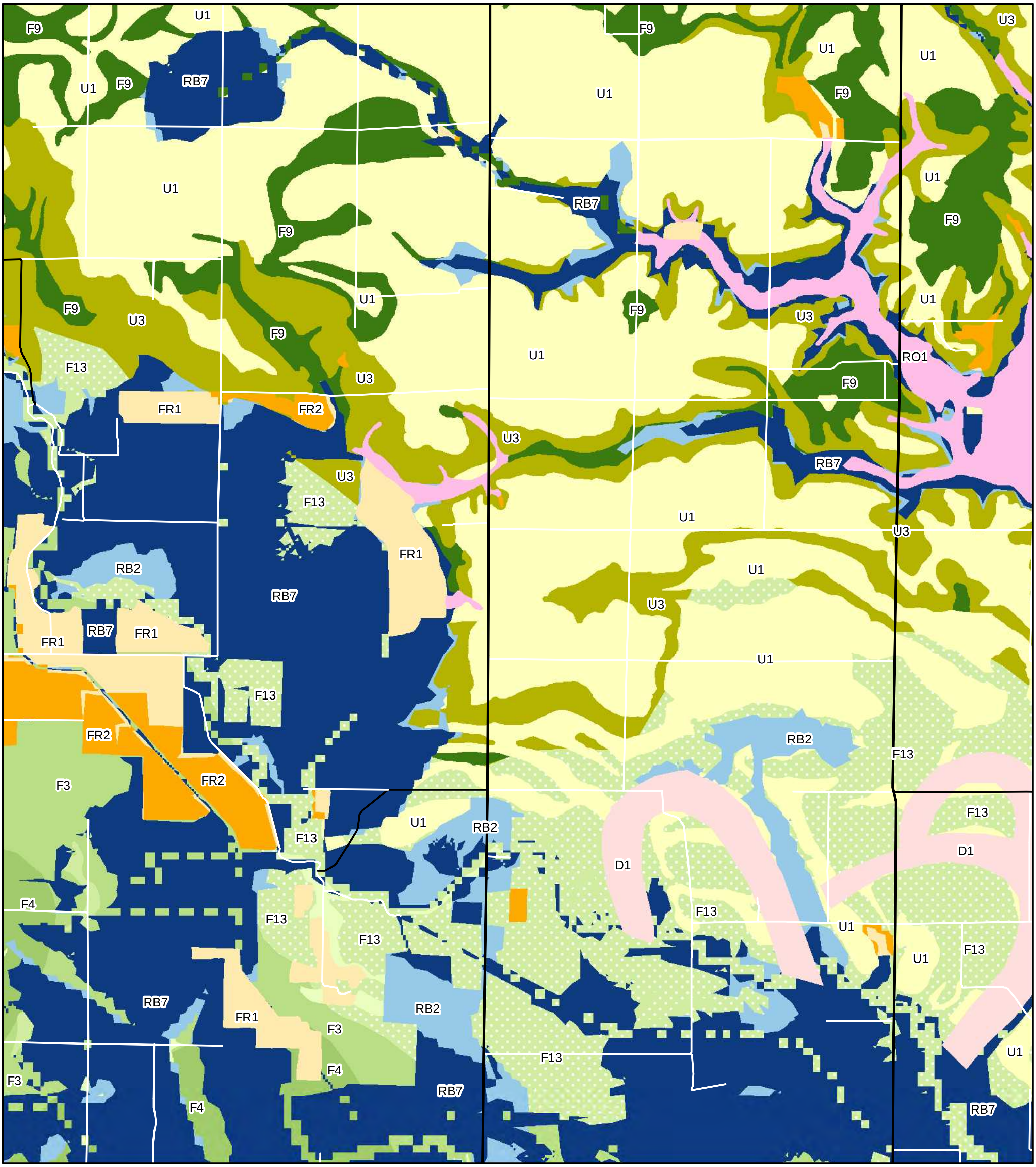
O4

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983



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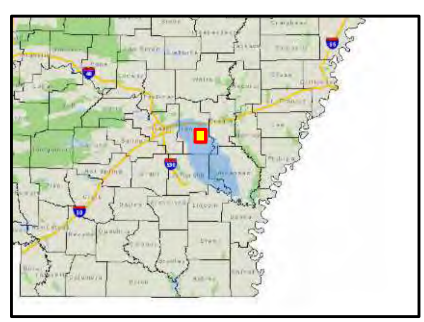
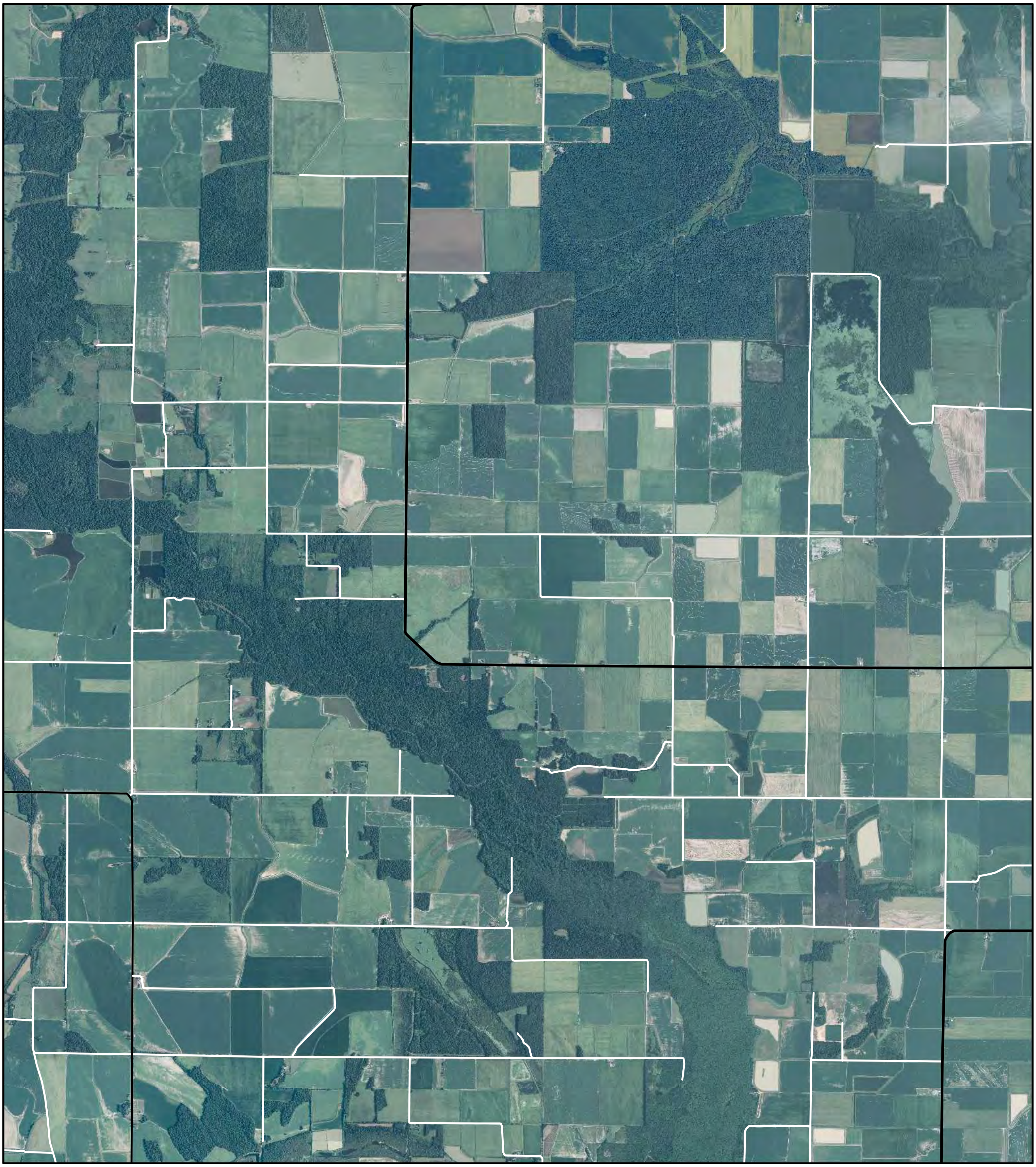
O4

N

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983





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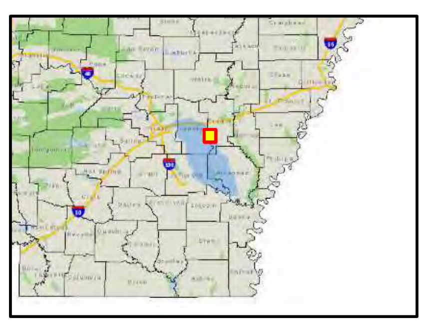
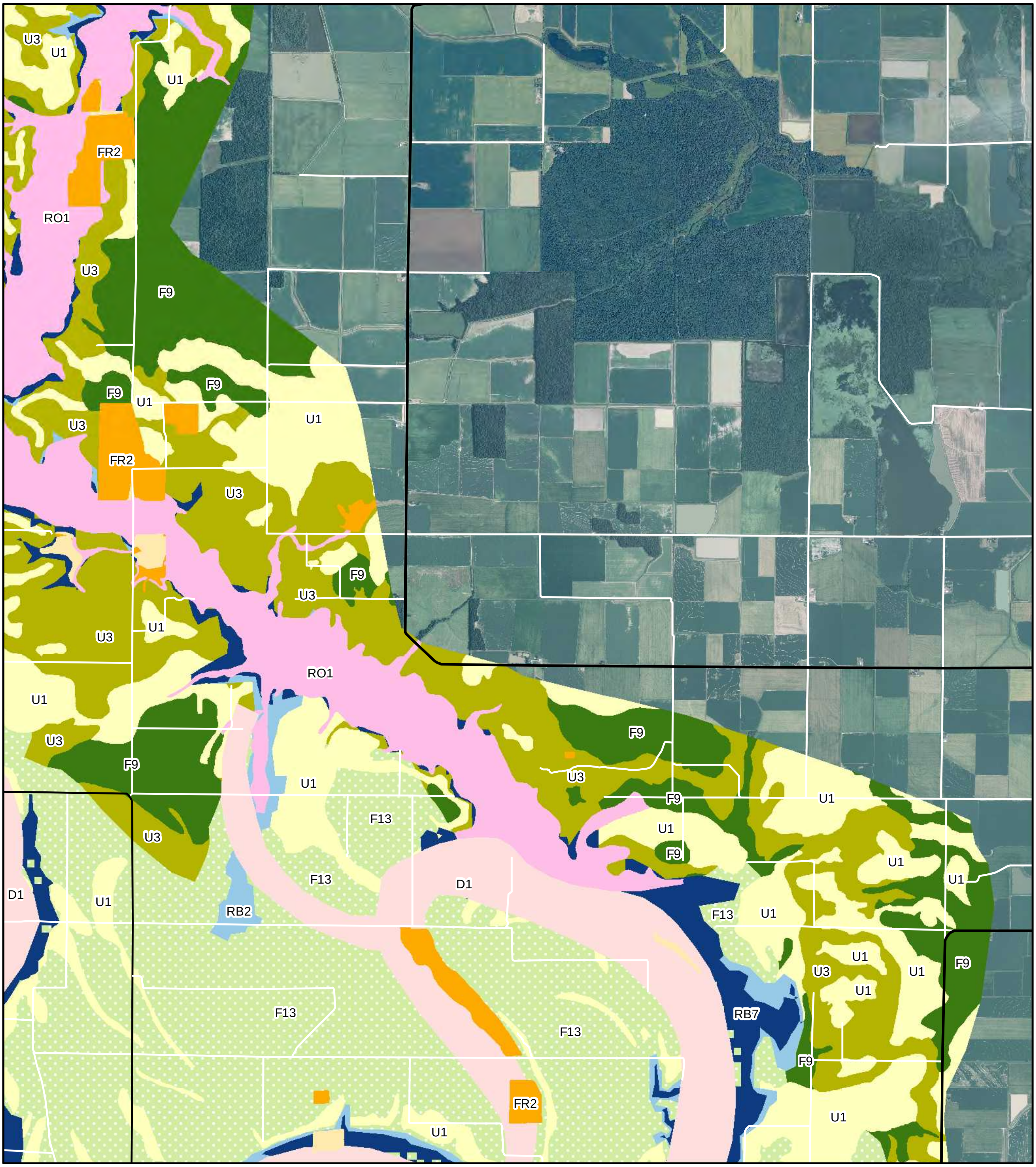
N

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

O5





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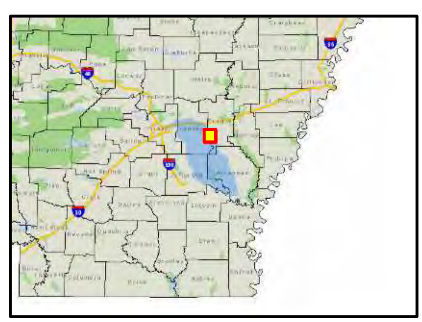
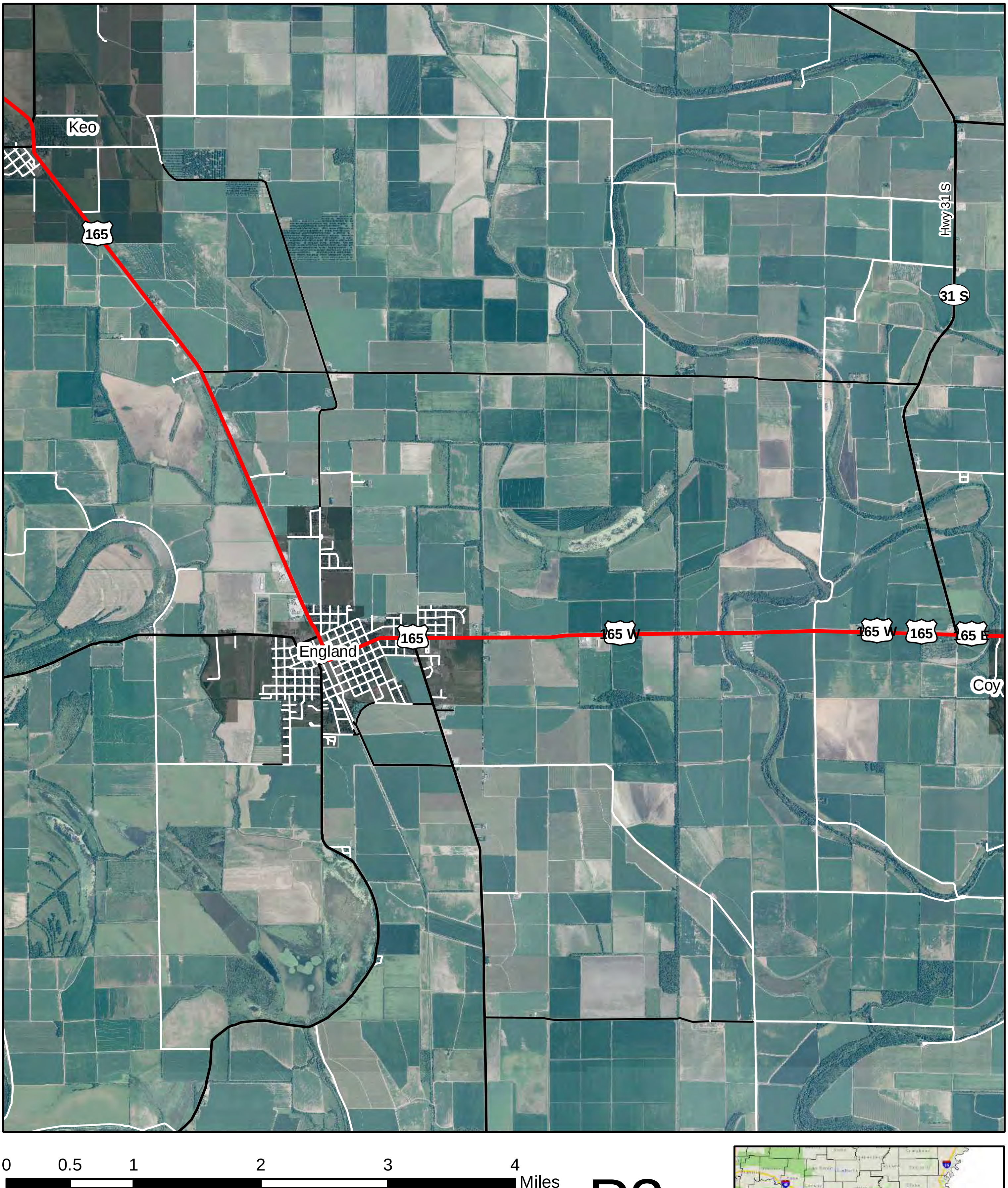
Datum: North American 1983

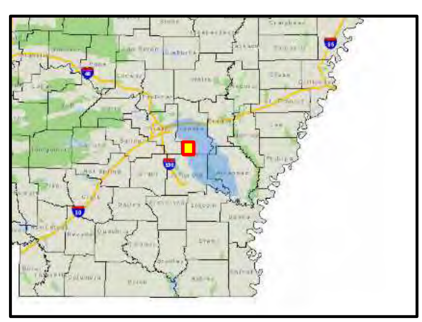
O5

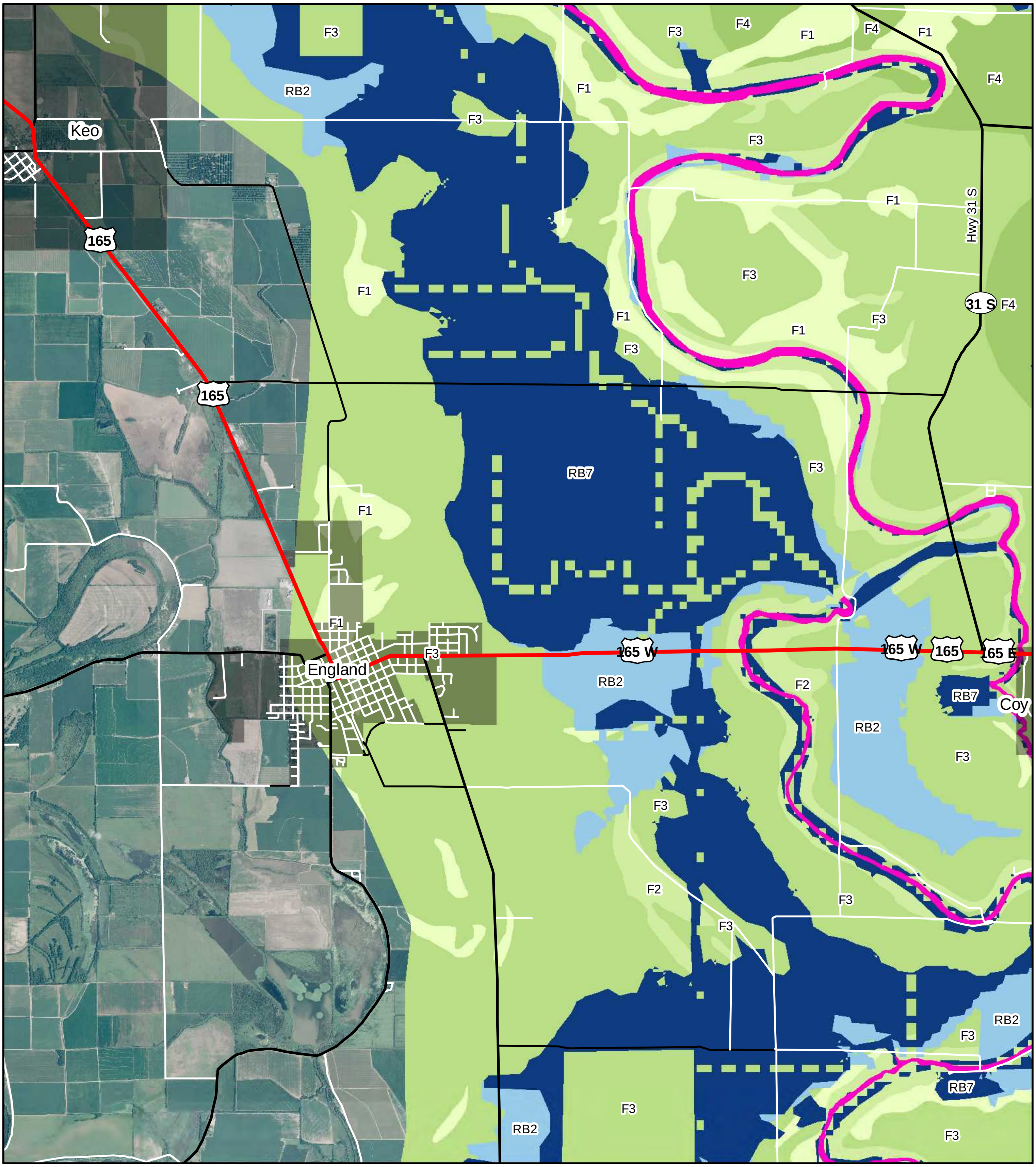




P3

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983



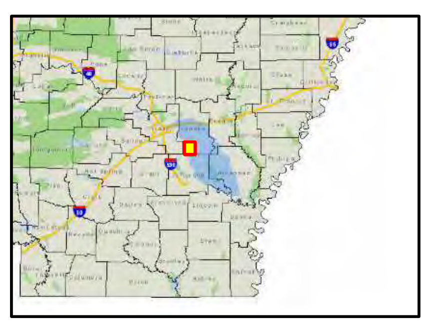


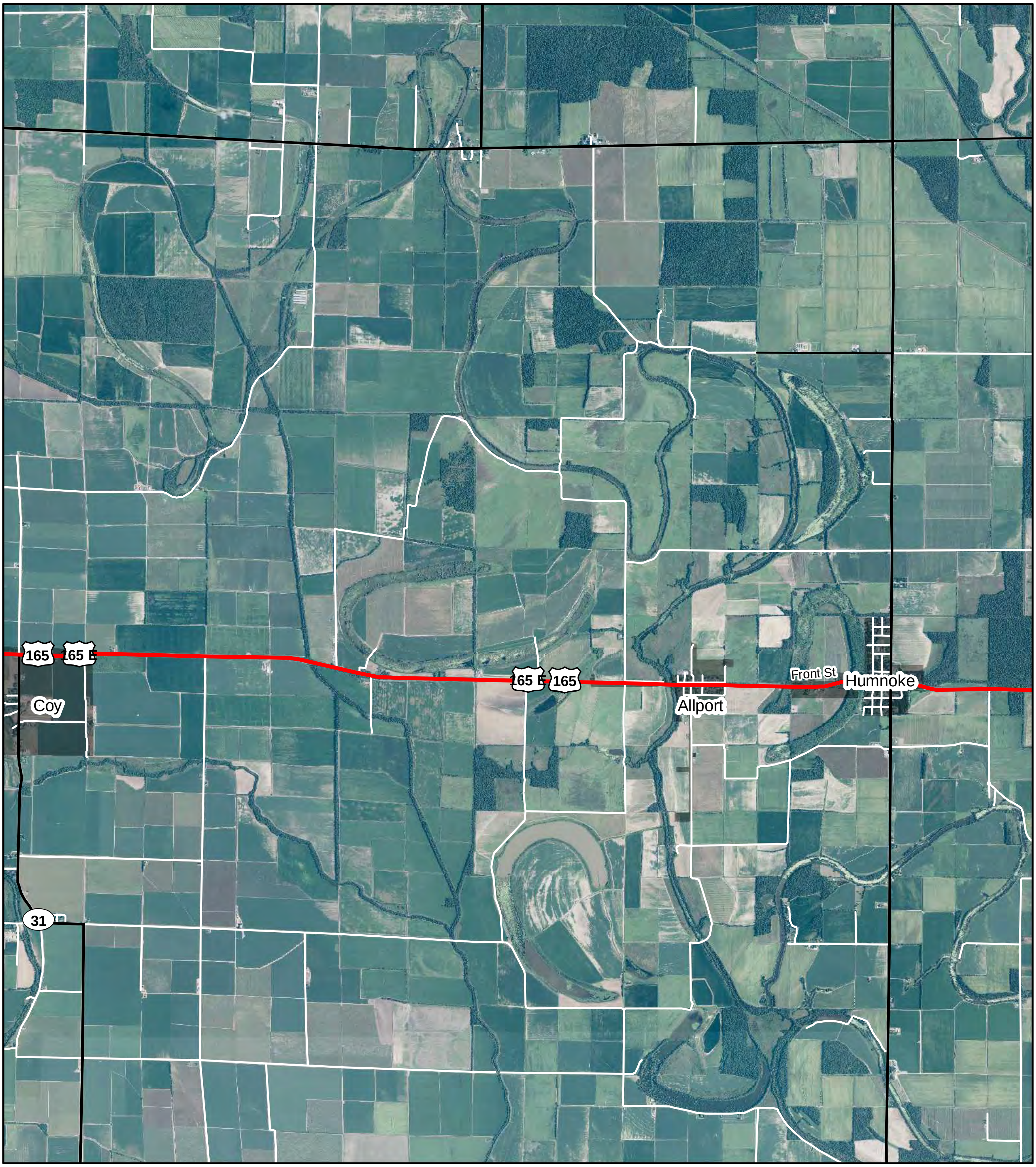
0 0.5 1 2 3 4 Miles

N

P3

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983



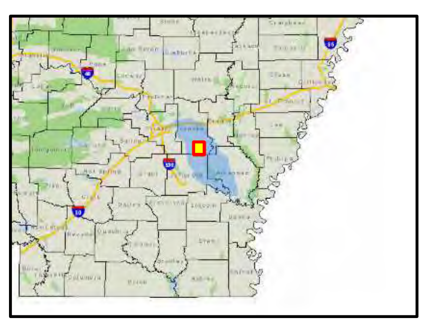


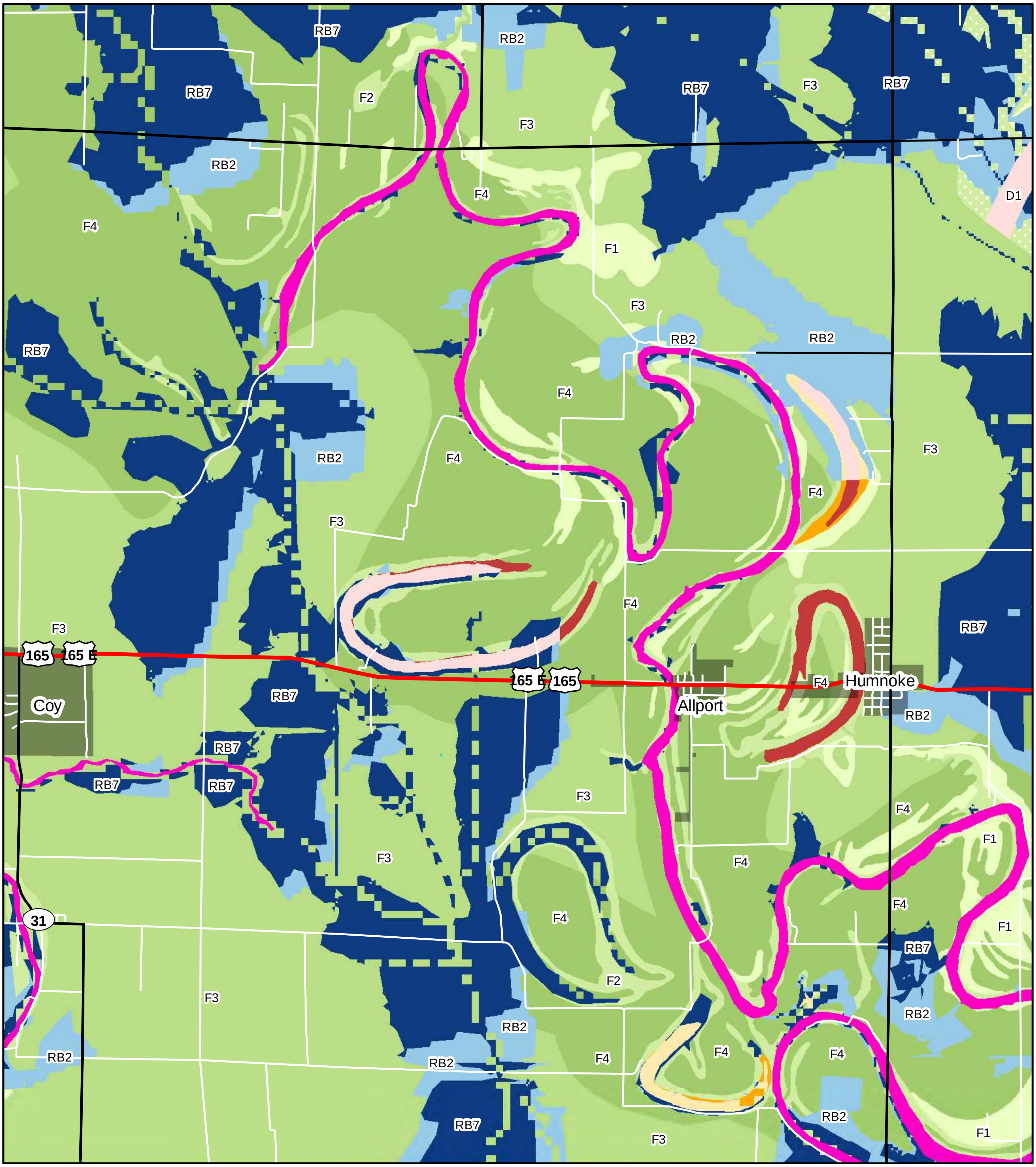
0 0.5 1 2 3 4
Miles

N

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

P4





0 0.5 1 2 3 4 Miles

N

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
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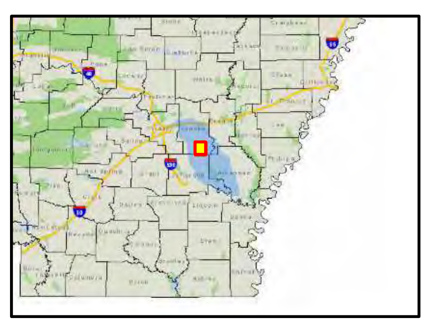
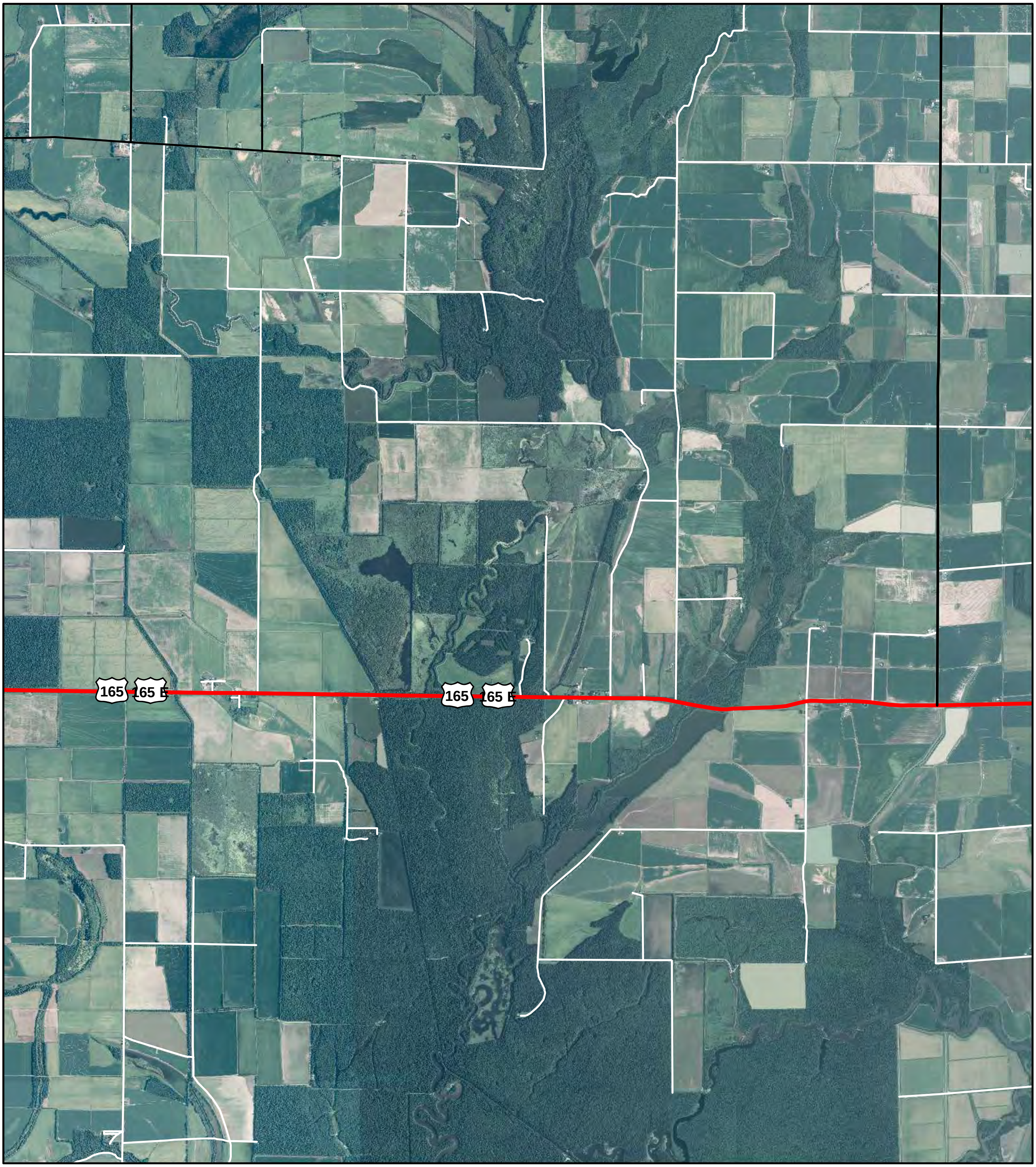
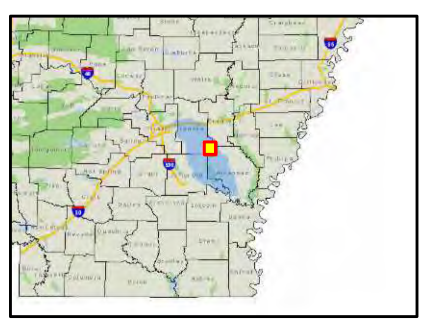
P4







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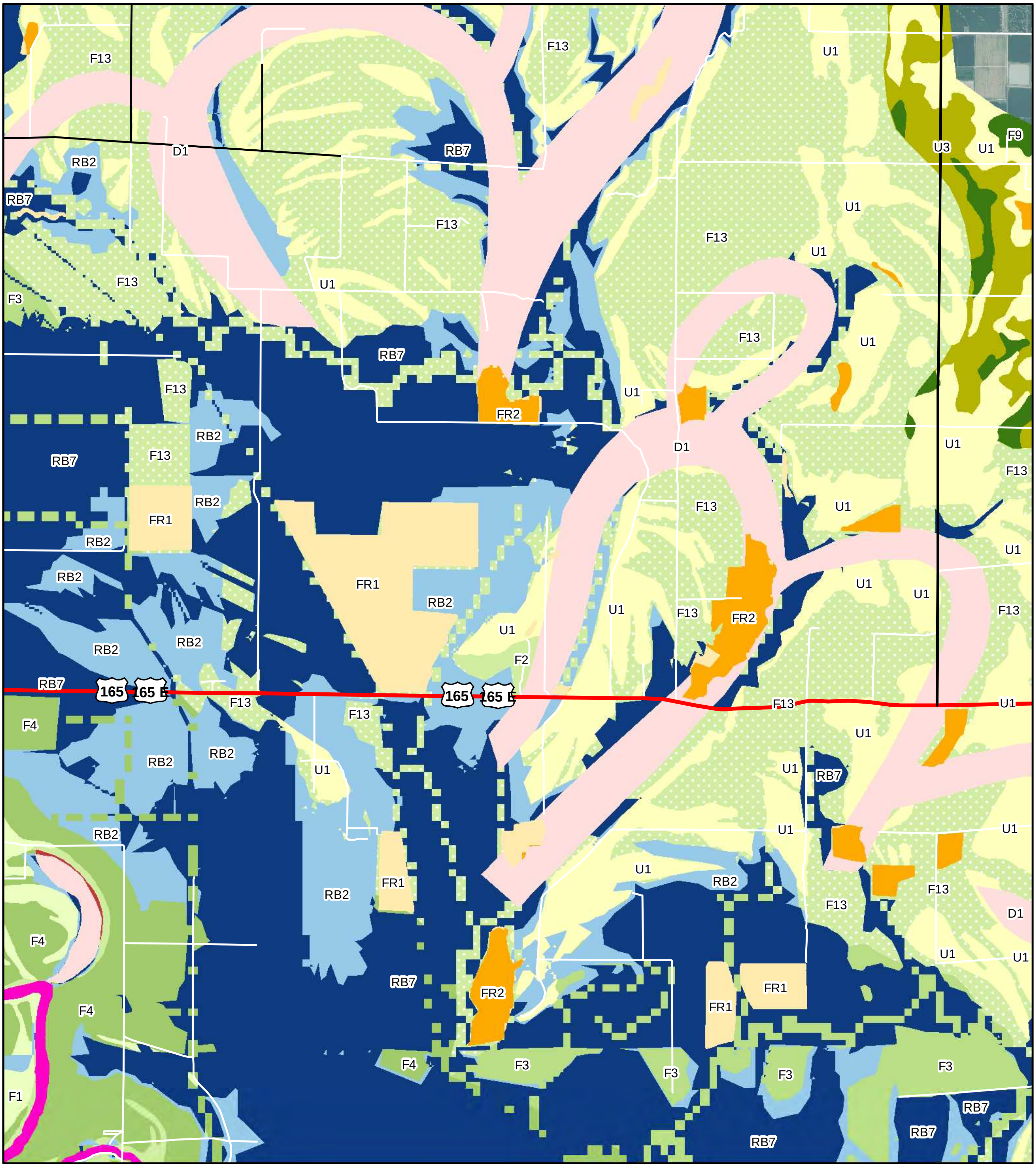
N

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

P5



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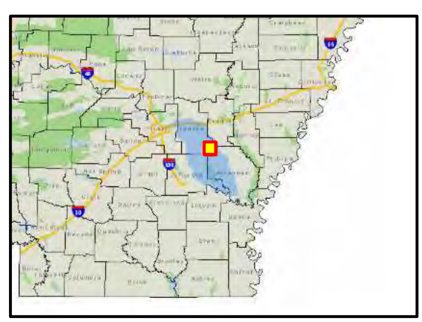
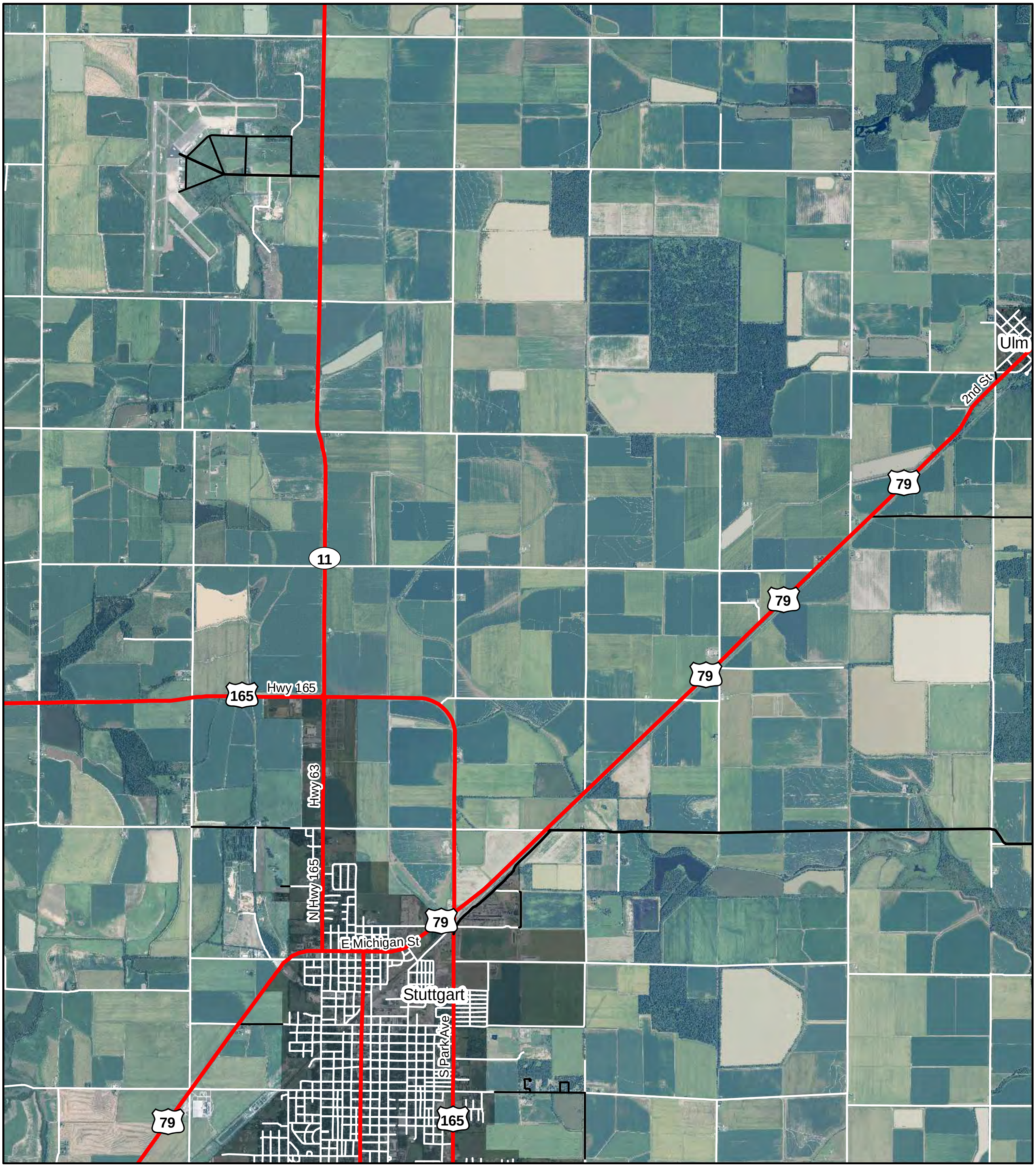
Projection: Transverse Mercator
Datum: North American 1983

P5



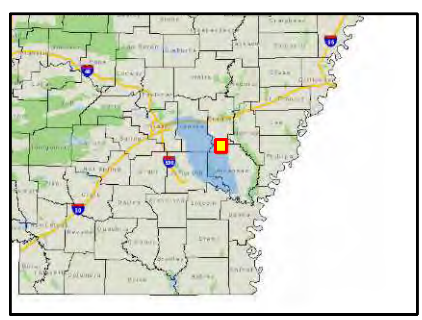


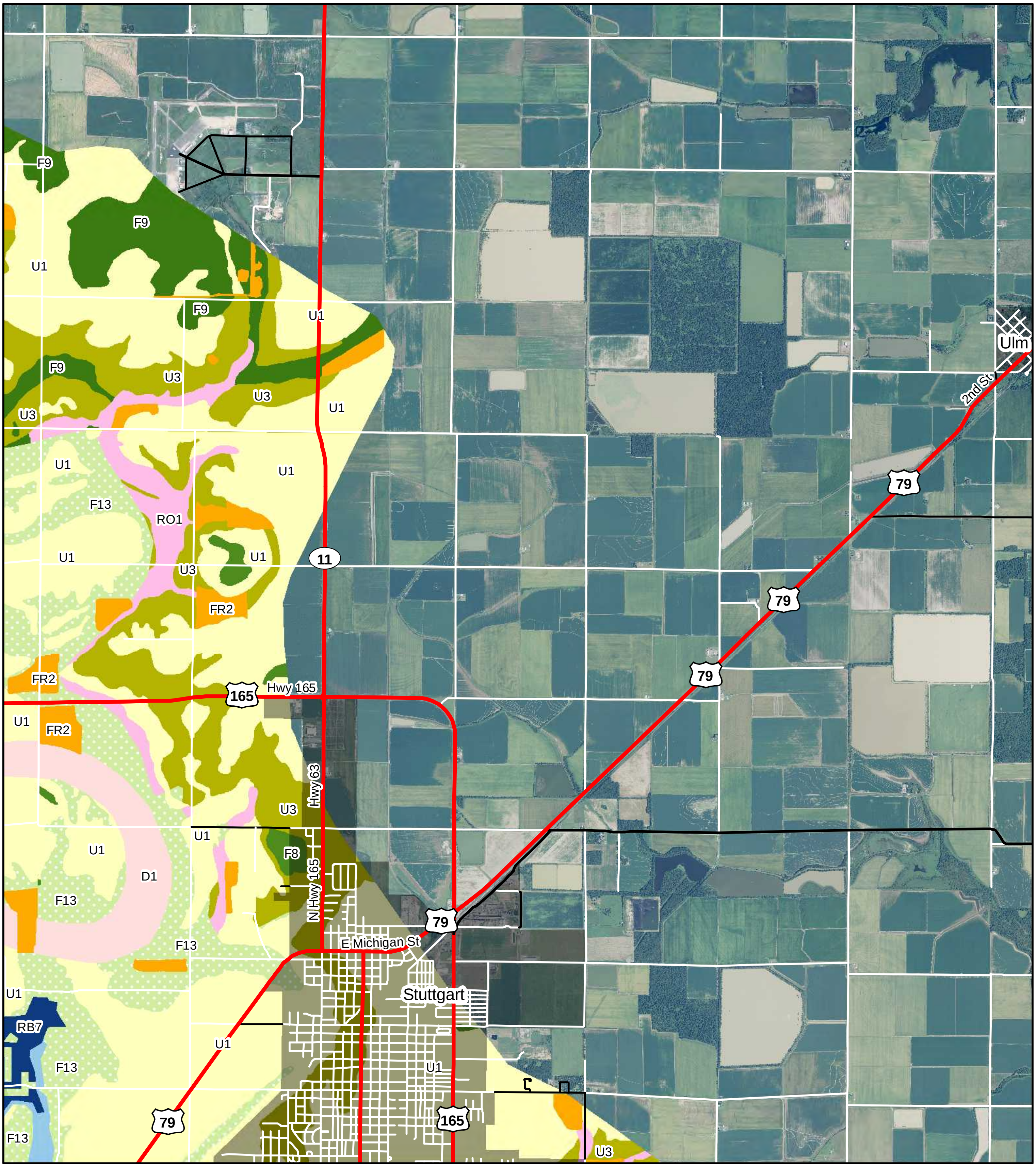
0 0.5 1 2 3 4 Miles

N

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

P6



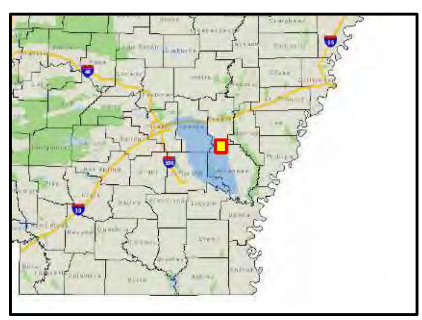


0 0.5 1 2 3 4 Miles

N

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

P6

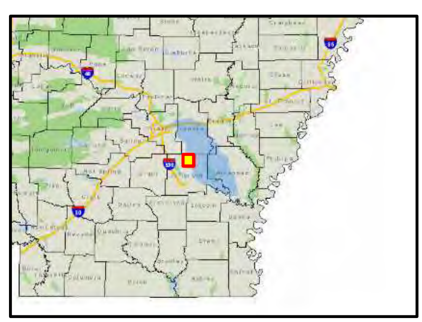


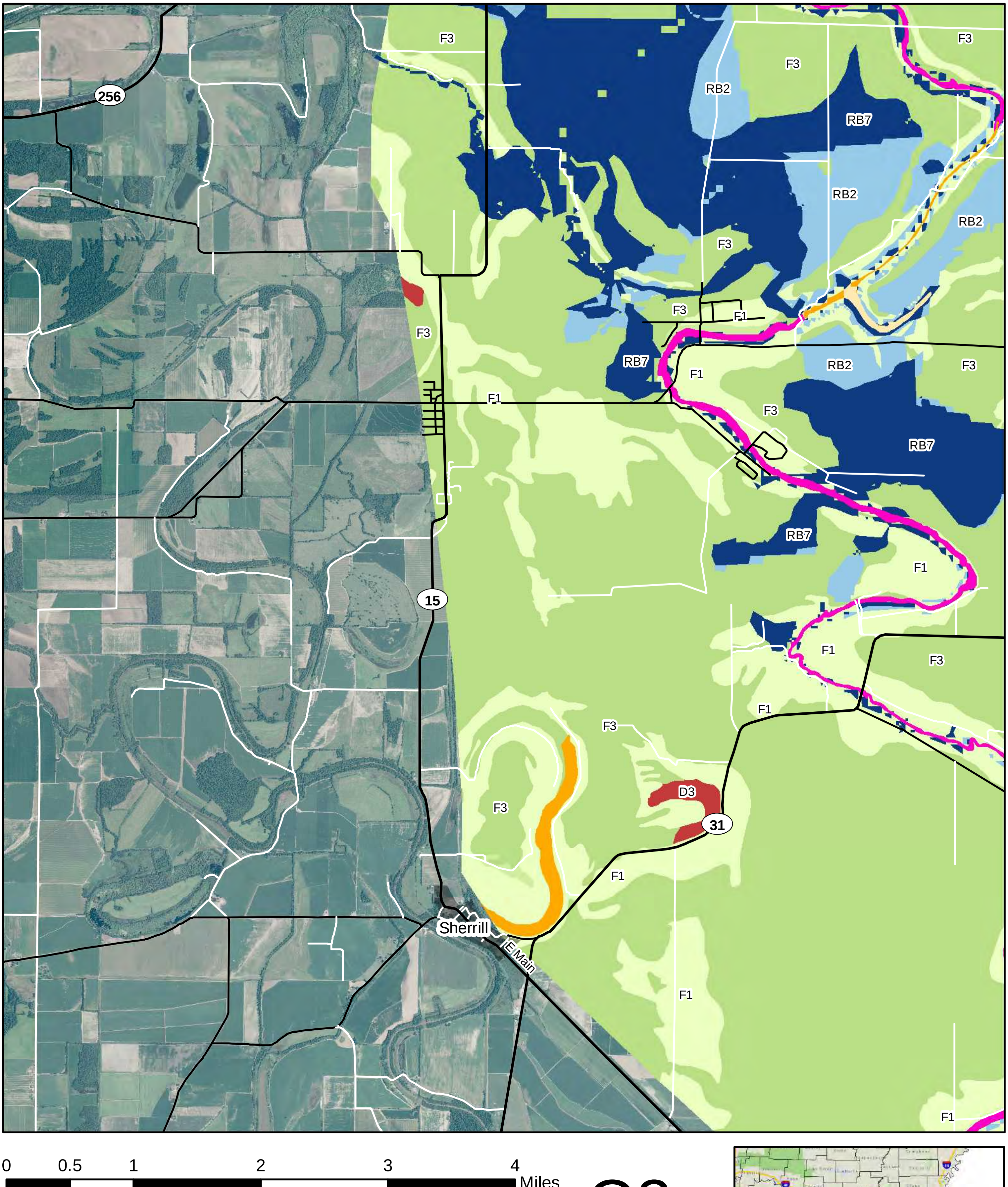
0 0.5 1 2 3 4 Miles

N

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

Q3





Q3

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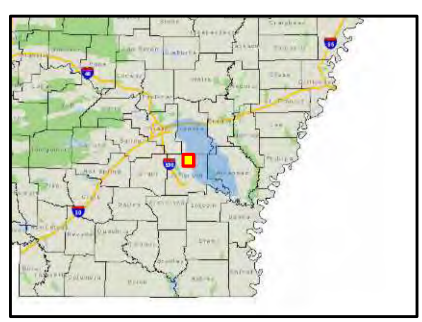
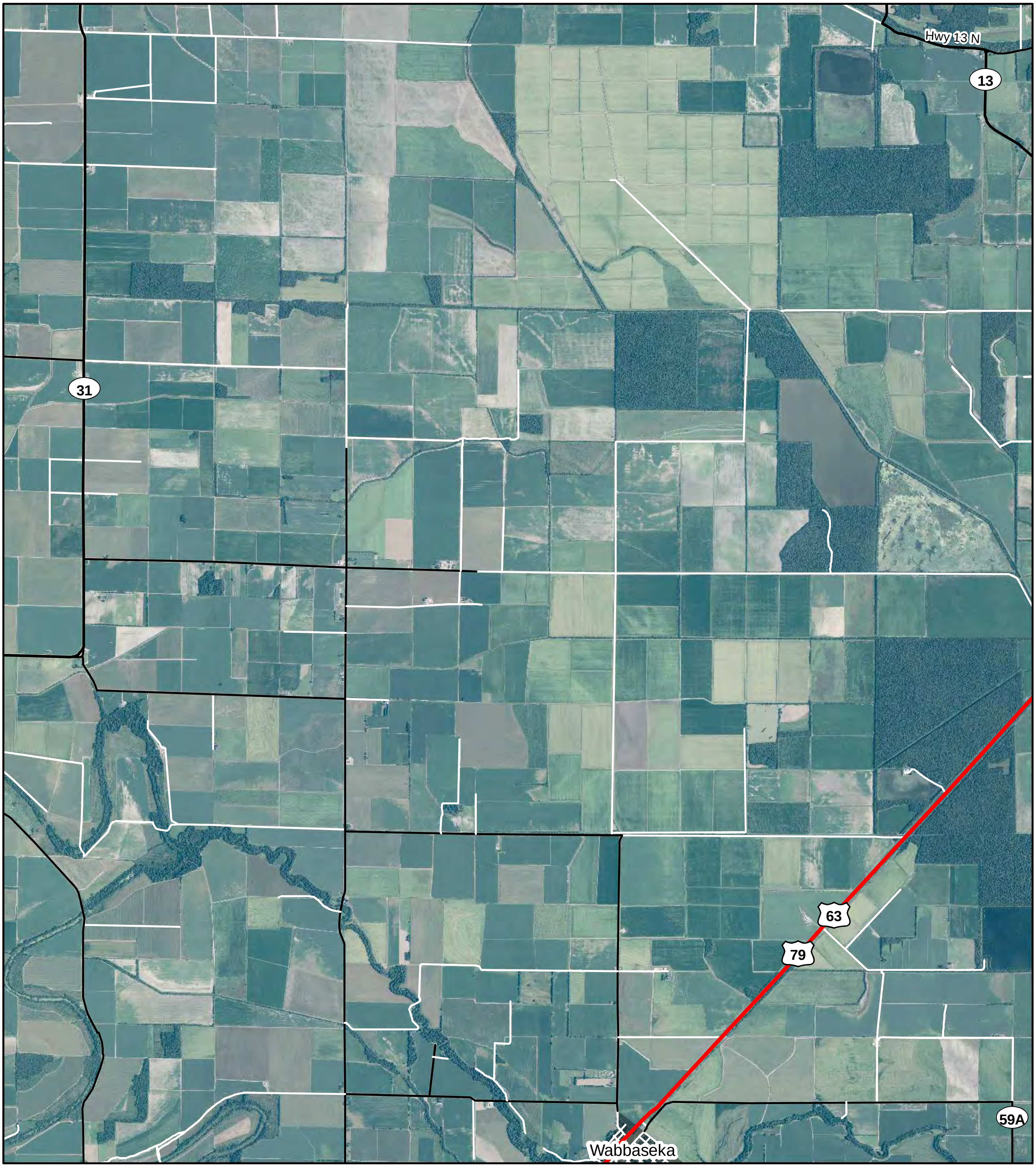
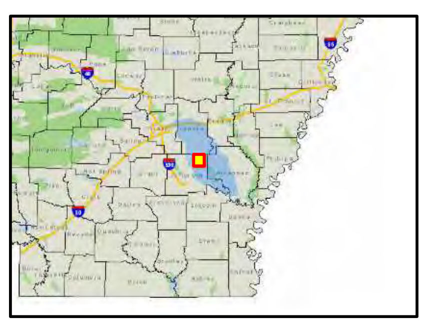
Datum: North American 1983





0 0.5 1 2 3 4 Miles

Q4



N

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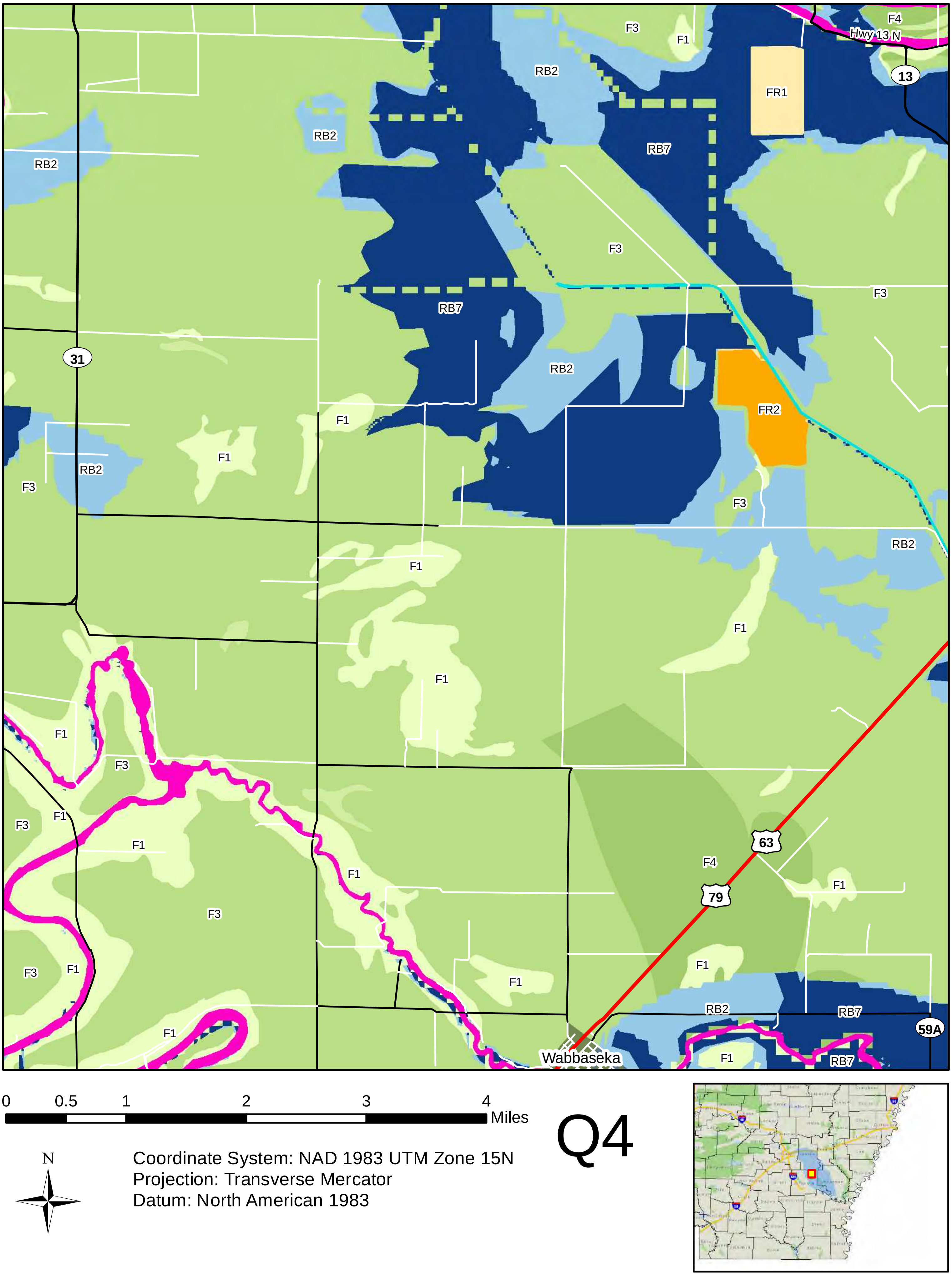
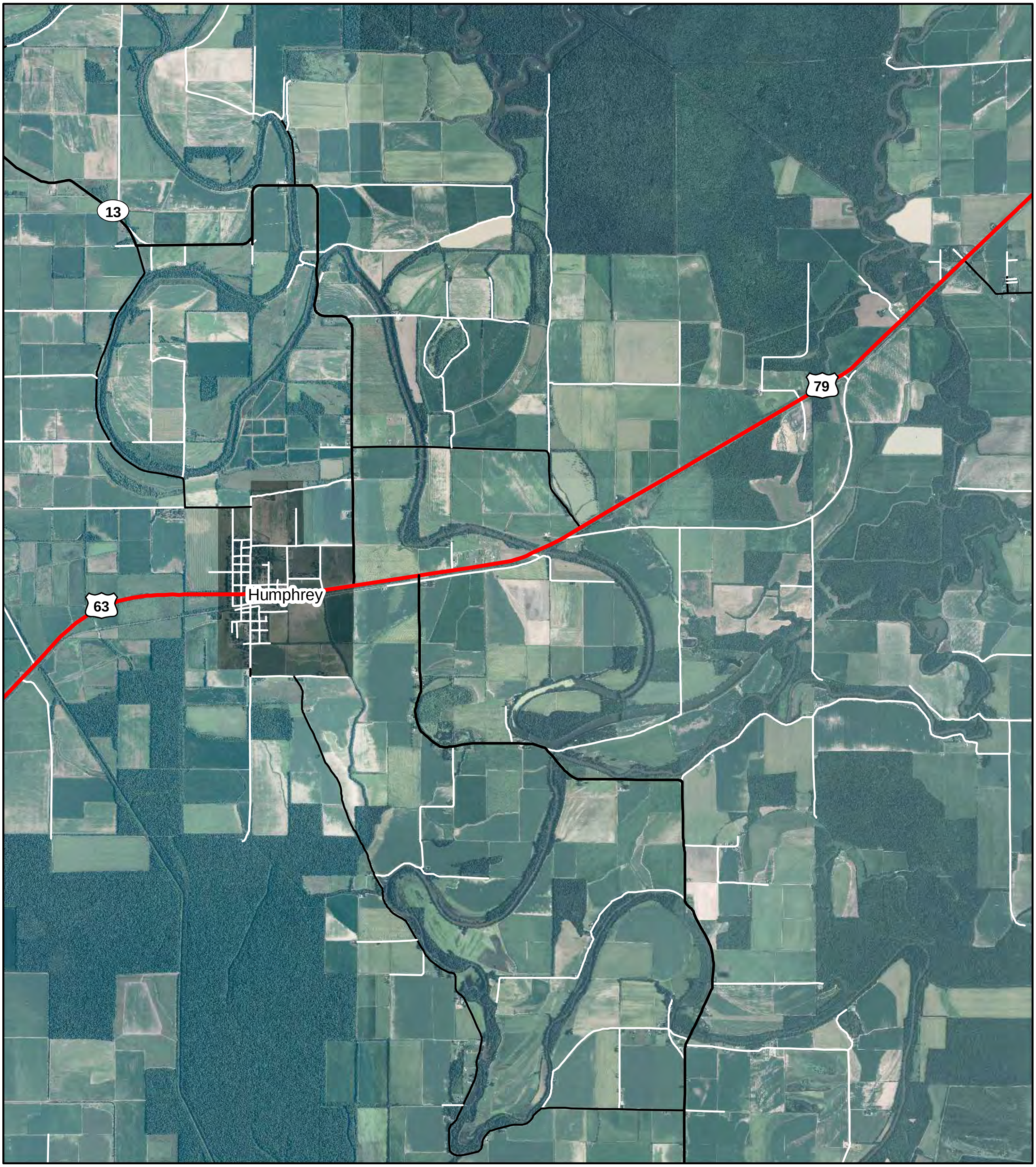
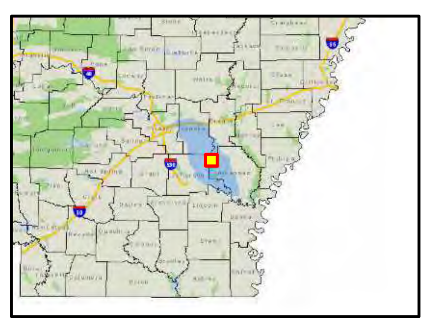
Projection: Transverse Mercator
Datum: North American 1983


Hwy 13 N
13
31
63
79
59A
Wabbaseka
FR1
FR2
RB2
RB7
F1
F3
F4
0
0.5
1
2
3
4
Miles
N
Q4
Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983



0 0.5 1 2 3 4 Miles

Q5



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0 0.5 1 2 3 4 Miles

N

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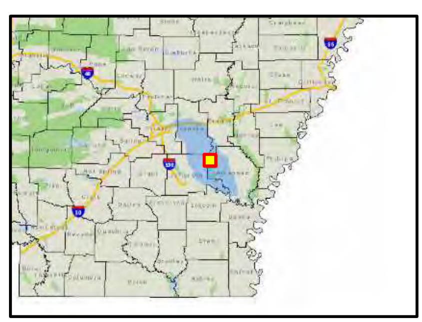
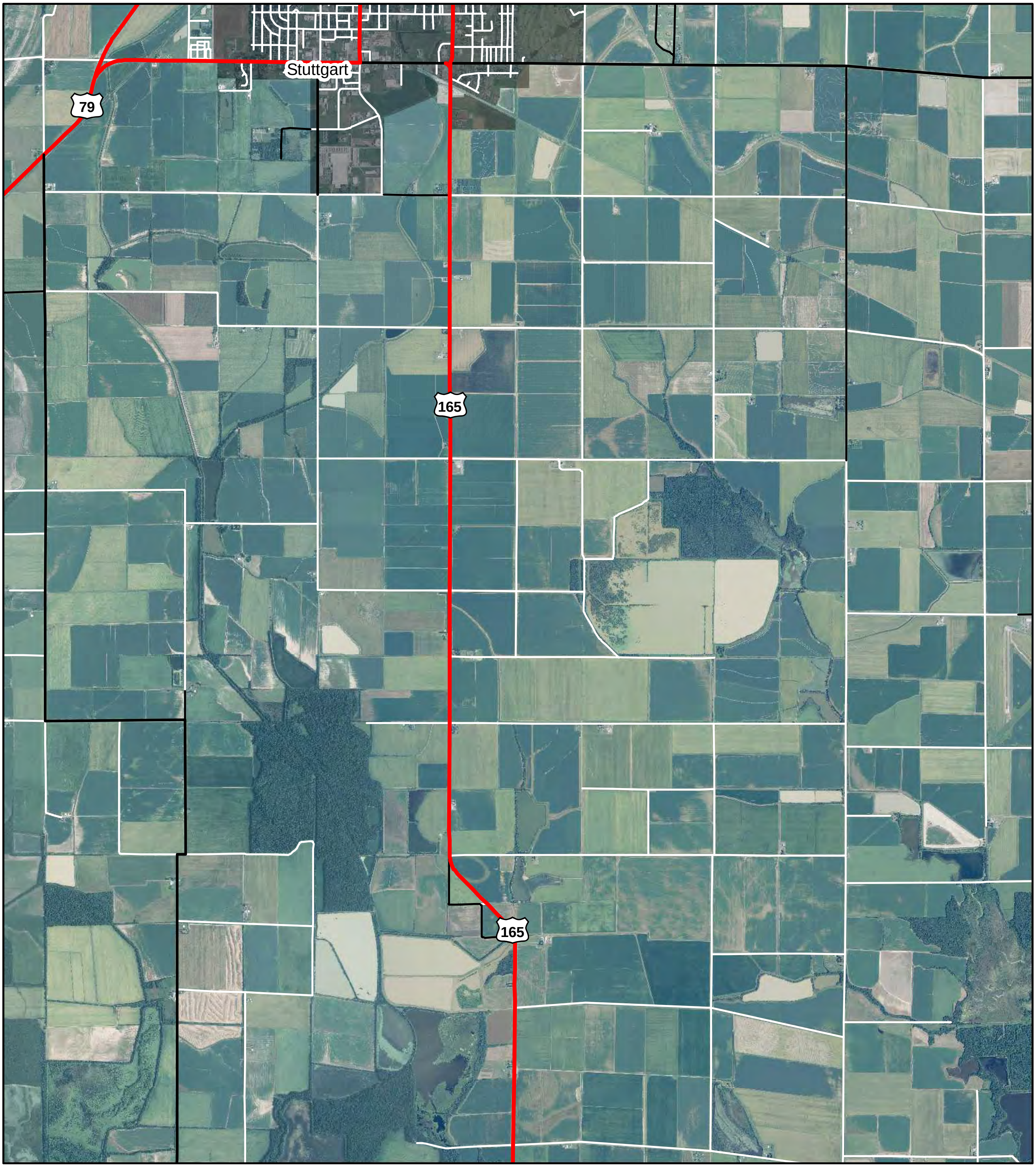
Q5



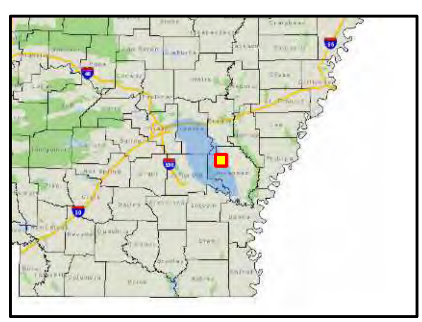


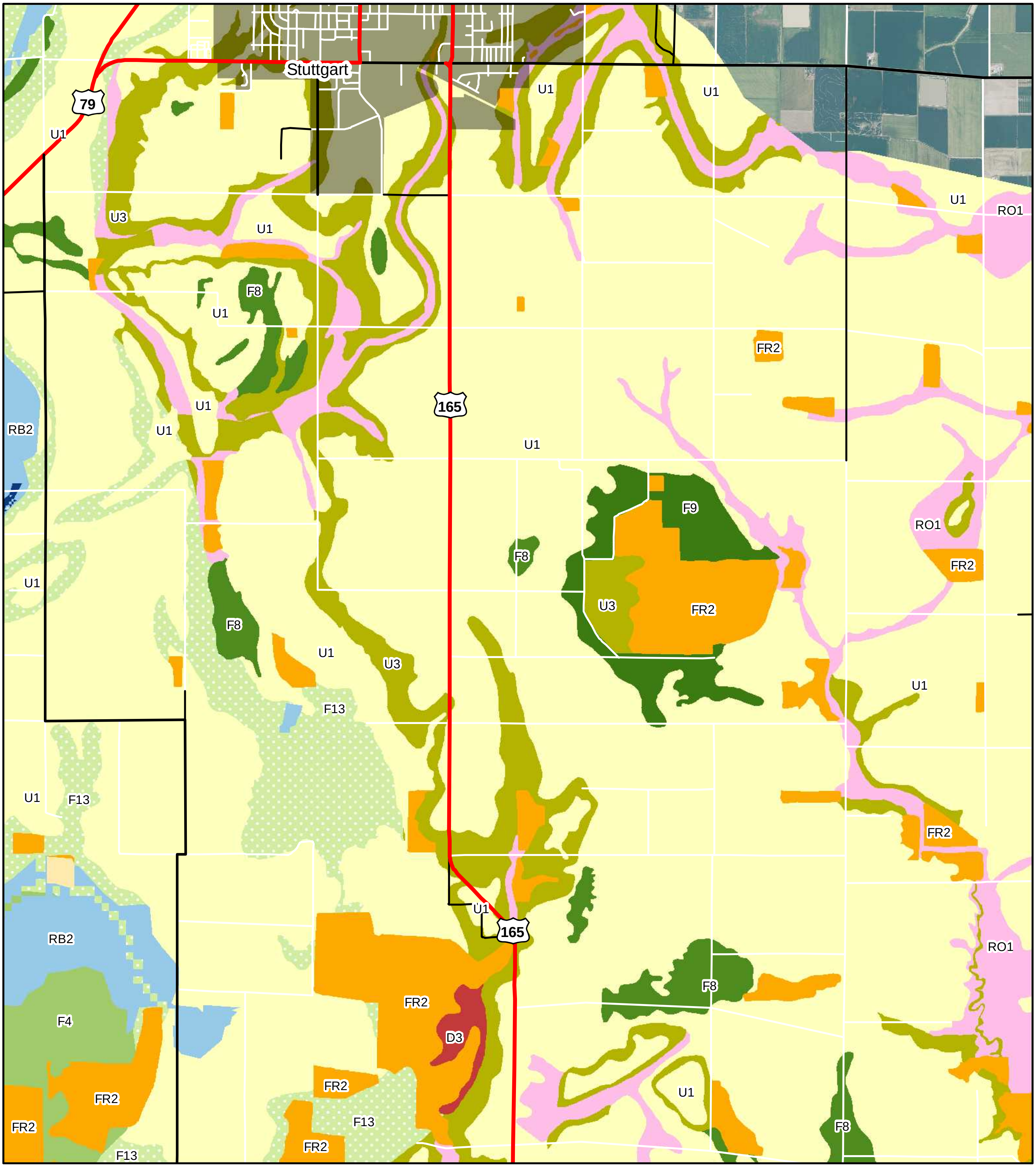
0 0.5 1 2 3 4 Miles

N

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

Q6





0 0.5 1 2 3 4 Miles

N

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Projection: Transverse Mercator
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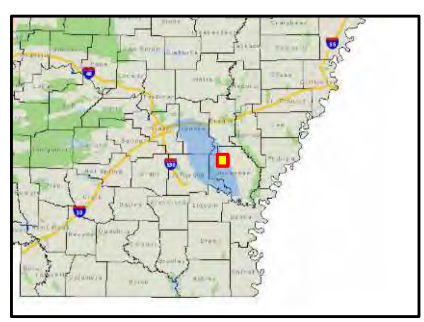
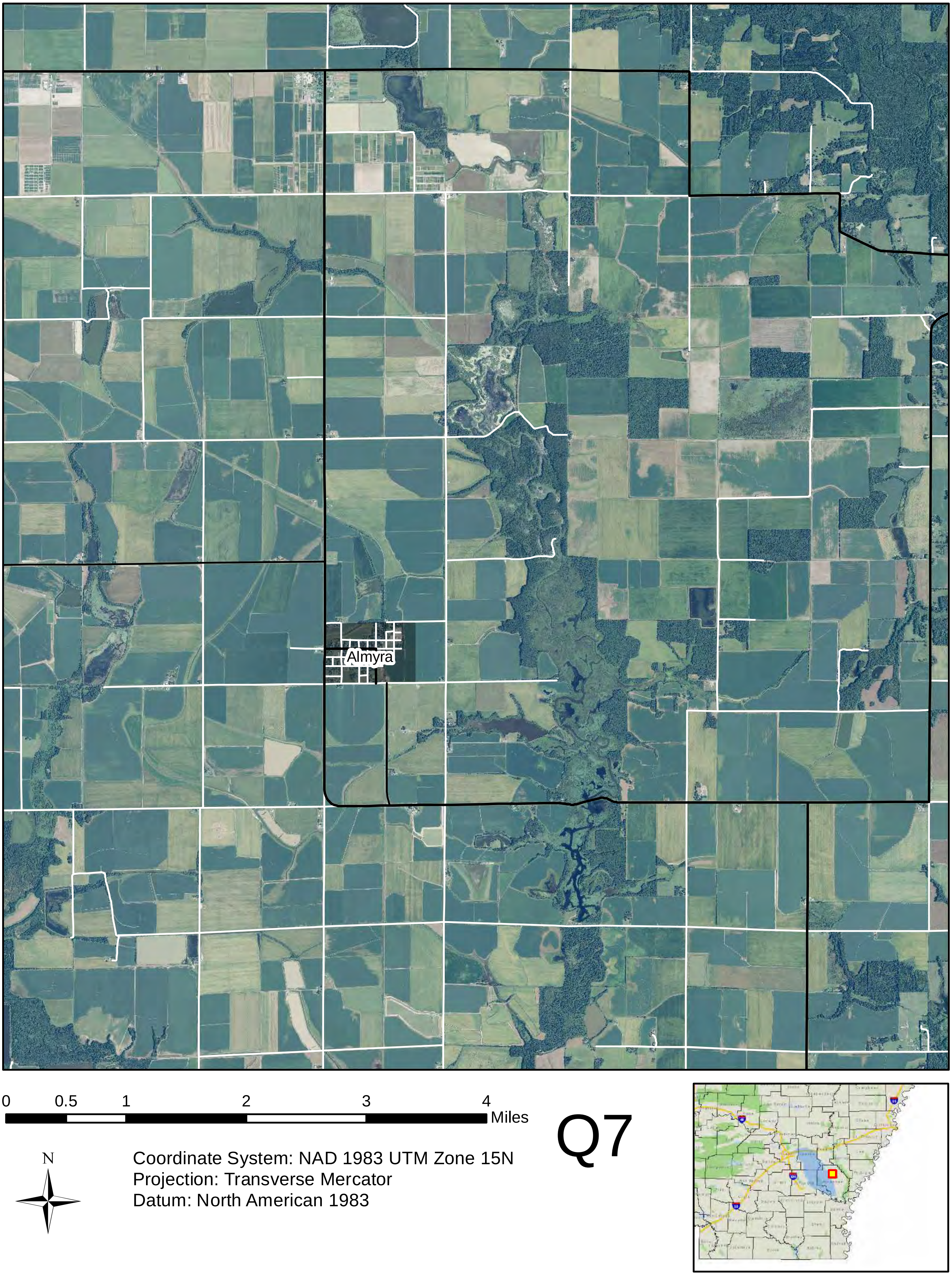
Q6





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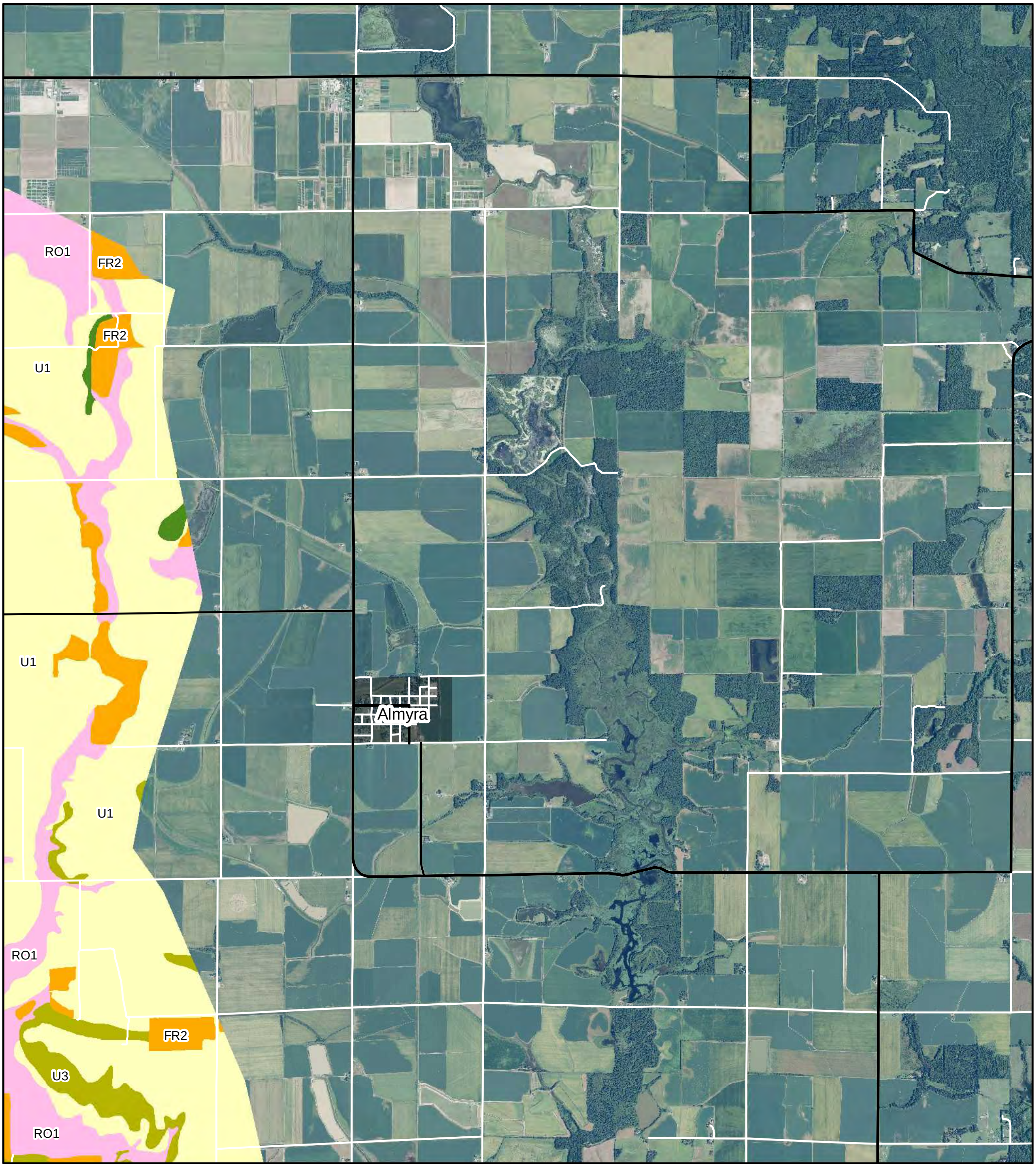
Projection: Transverse Mercator
Datum: North American 1983



0 0.5 1 2 3 4 Miles

Q7

N

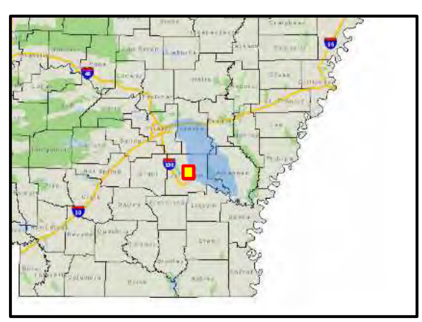
Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

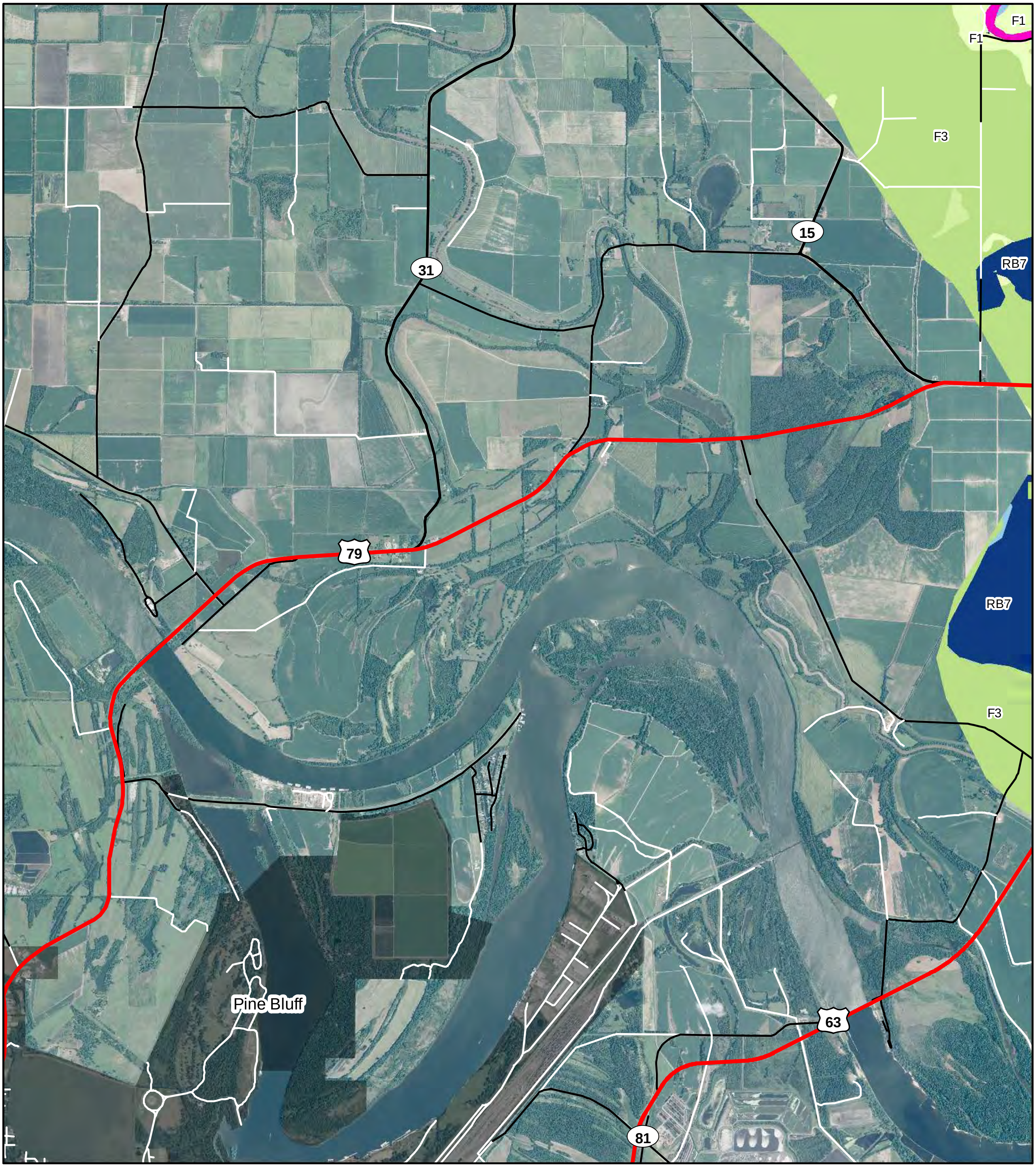
0 0.5 1 2 3 4 Miles

N

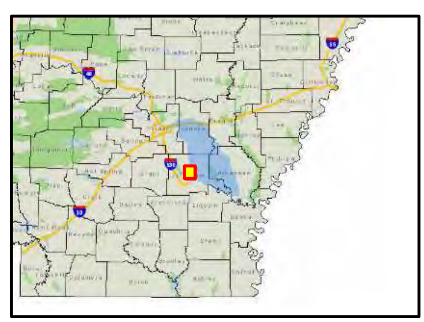
Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

R3





R3



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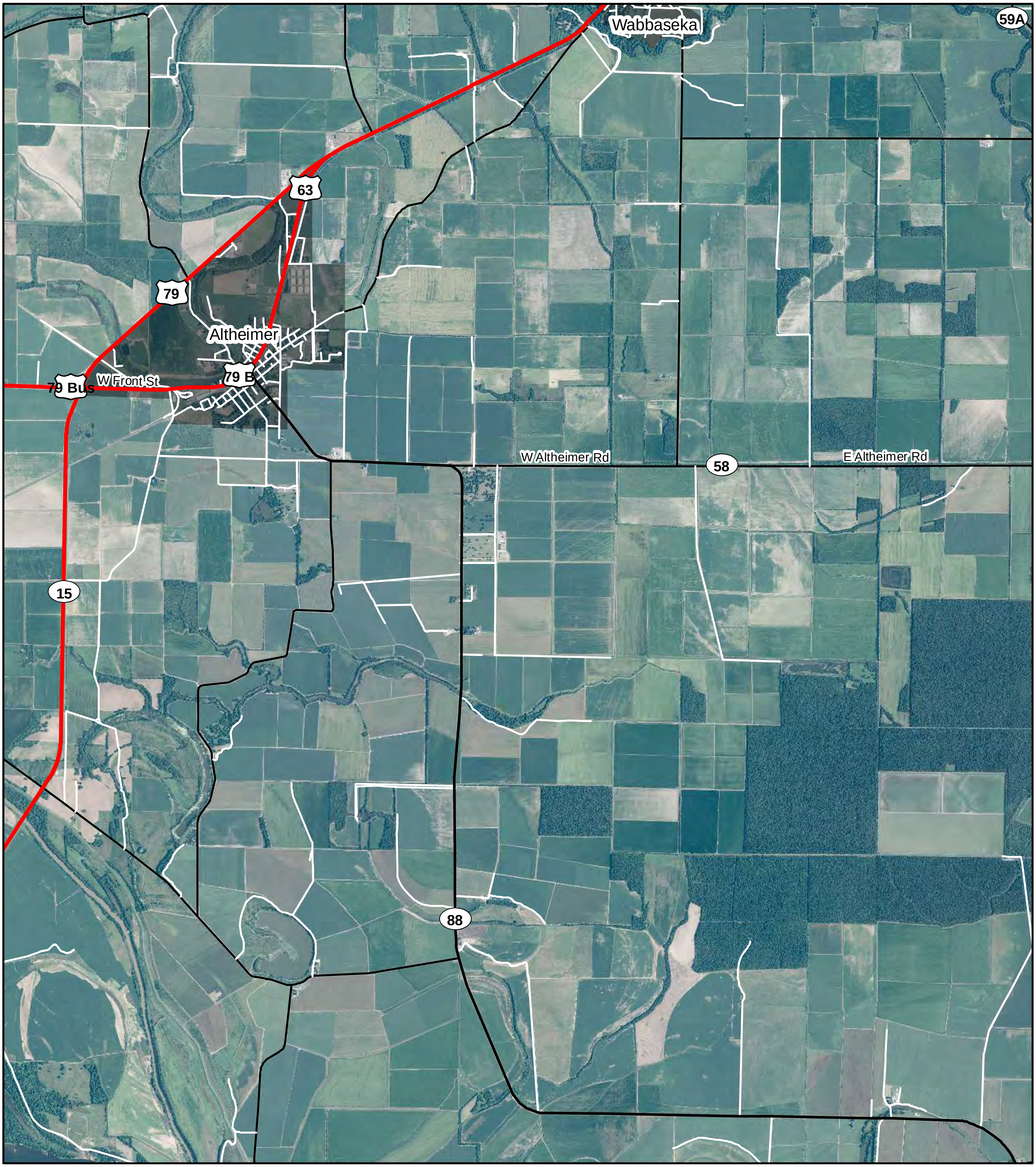
Projection: Transverse Mercator
Datum: North American 1983



0 0.5 1 2 3 4 Miles

N

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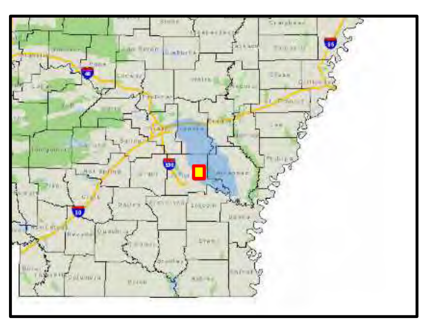
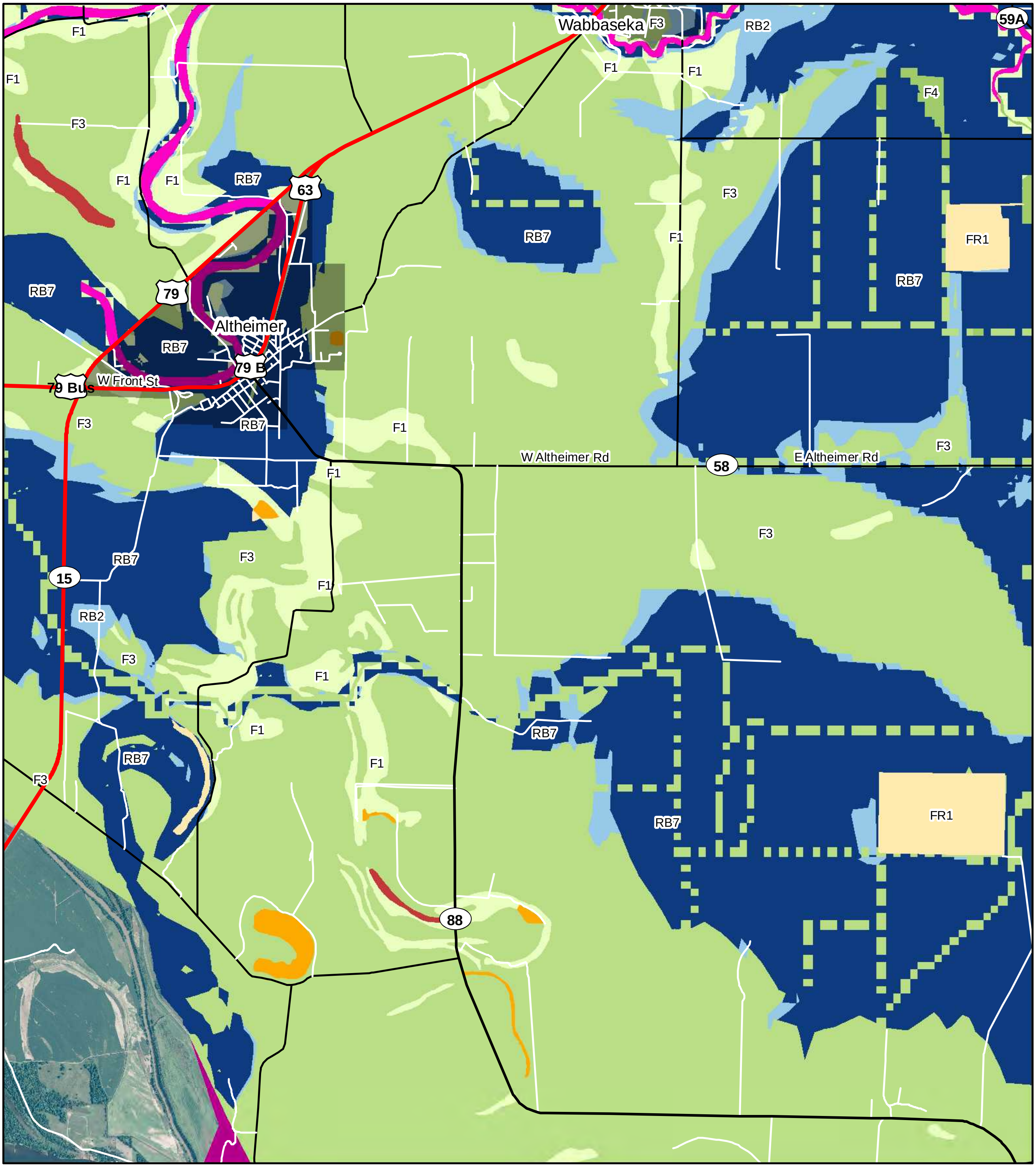
R4



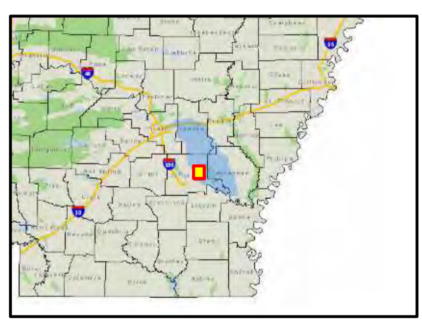


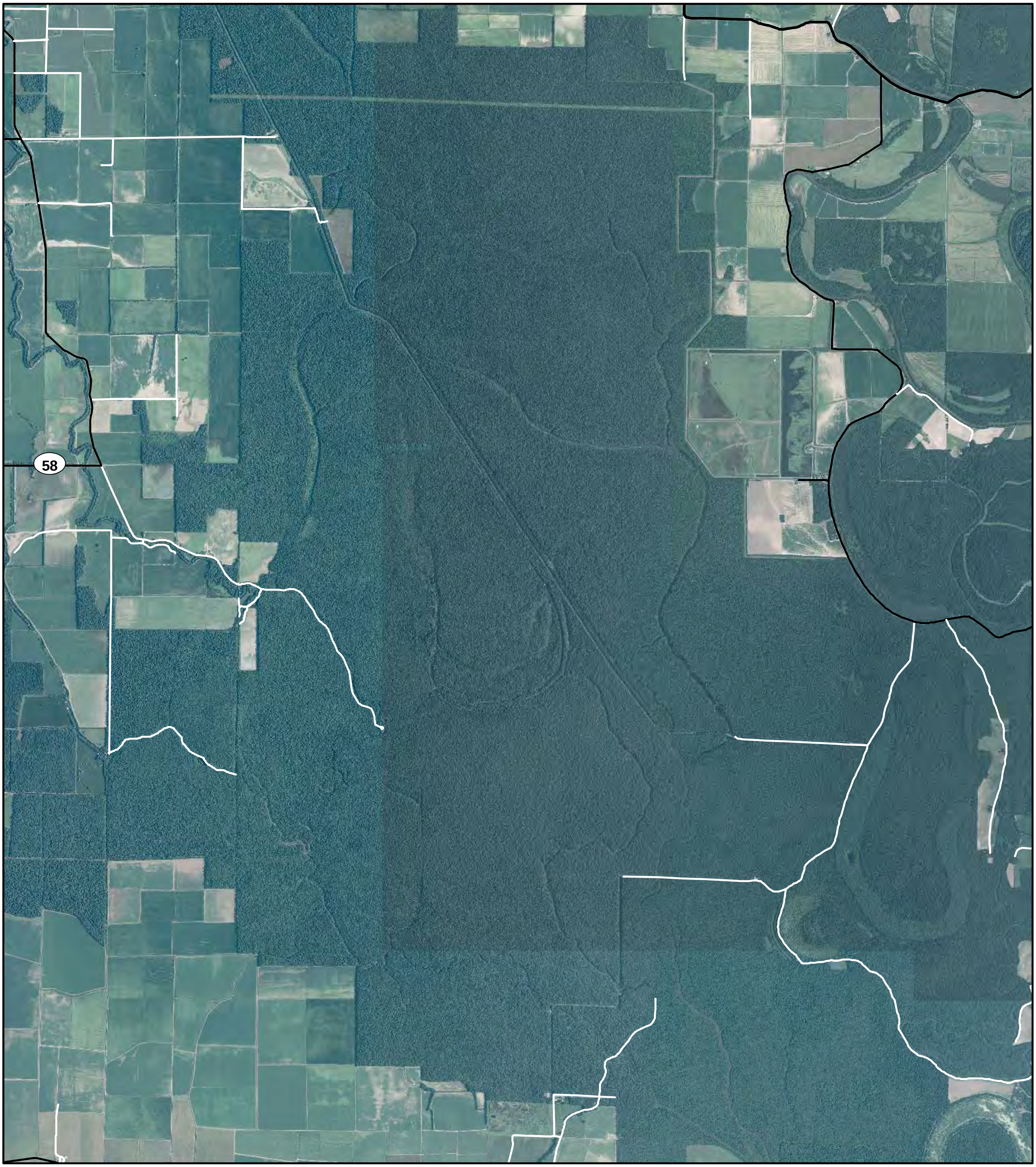
0 0.5 1 2 3 4 Miles

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

N

R4





0 0.5 1 2 3 4 Miles

N

Coordinate System: NAD 1983 UTM Zone 15N
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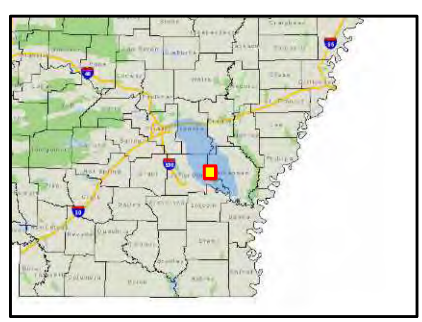
Datum: North American 1983

R5



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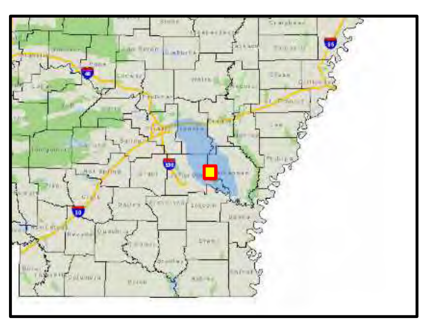
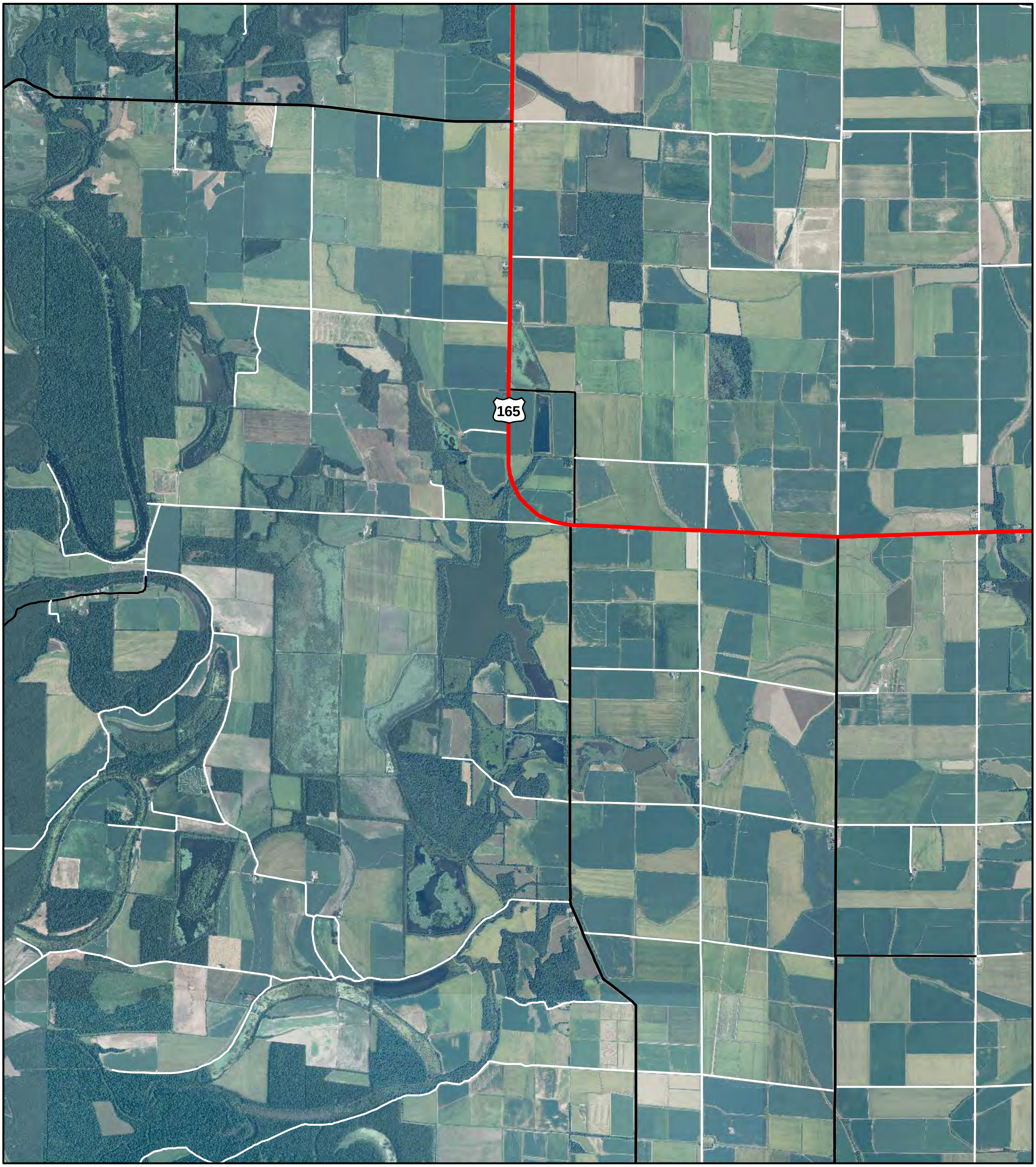
R5



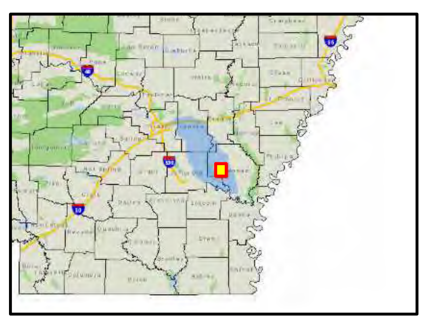


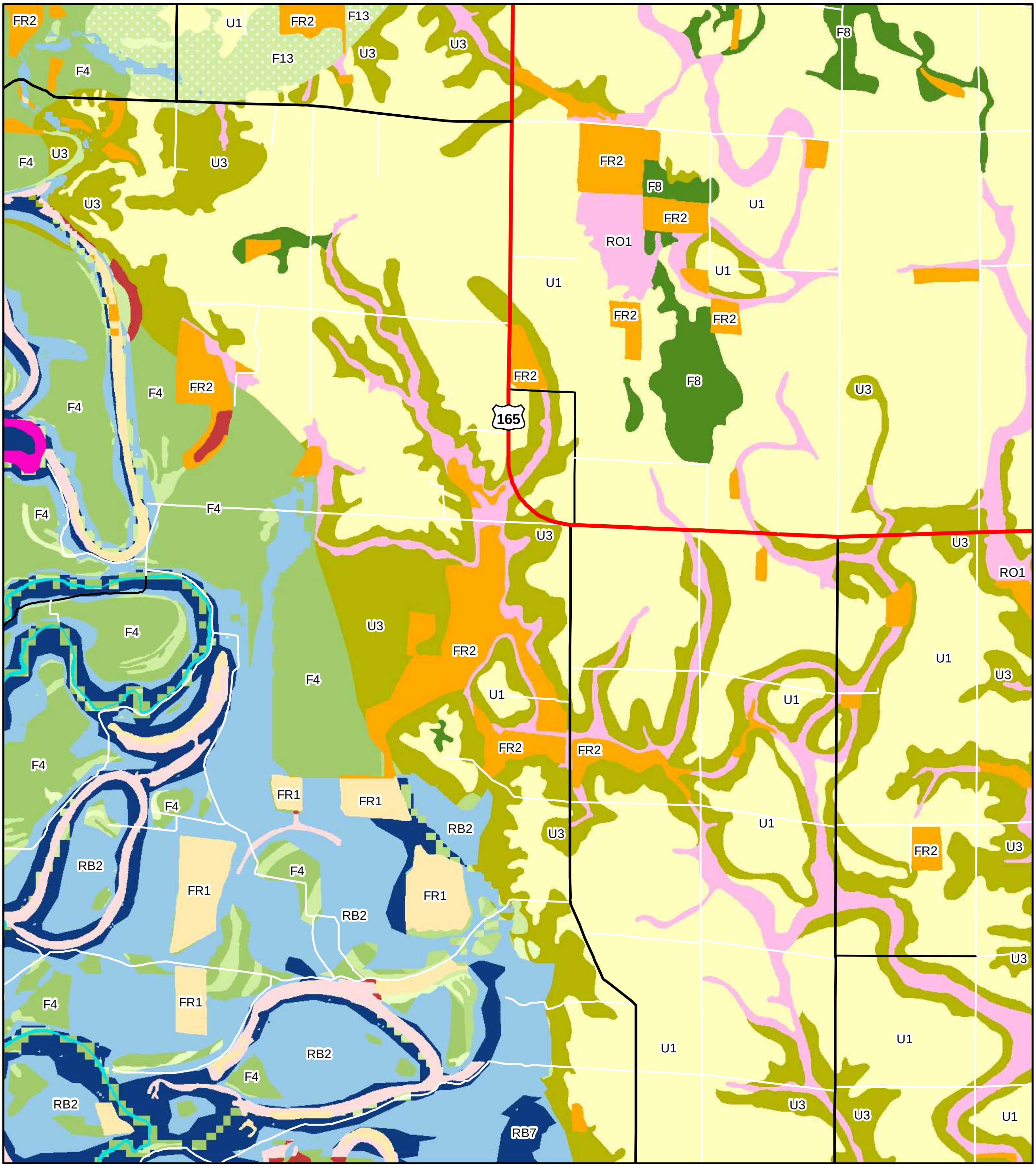
0 0.5 1 2 3 4 Miles

N

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

R6



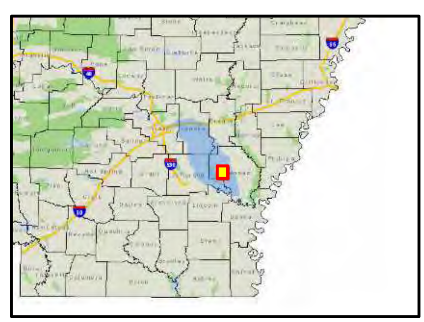


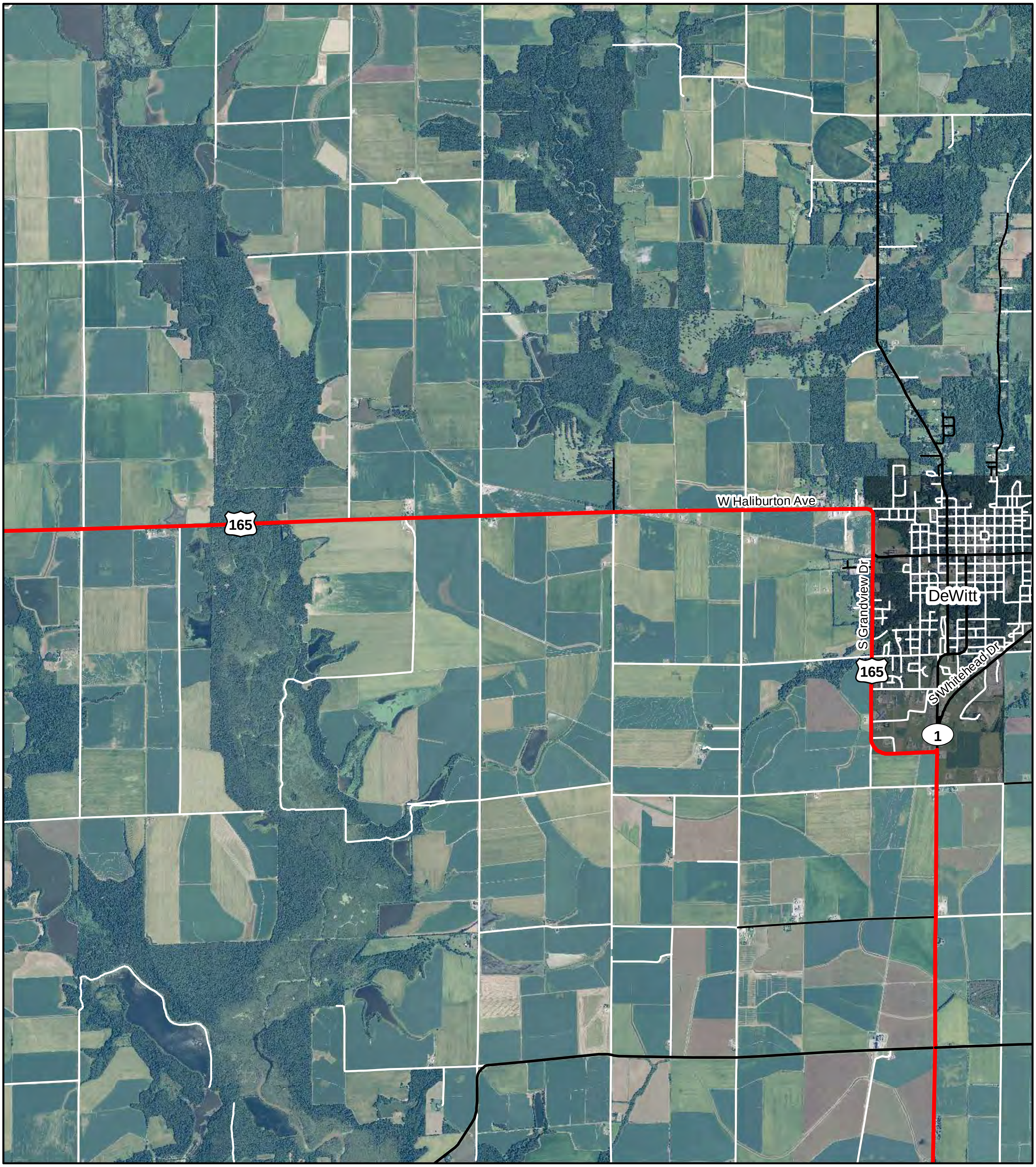
0 0.5 1 2 3 4 Miles

R6

N

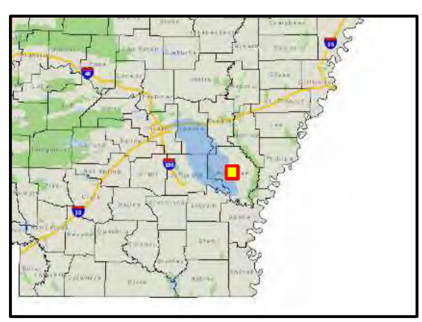
Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983





0 0.5 1 2 3 4 Miles

R7



N

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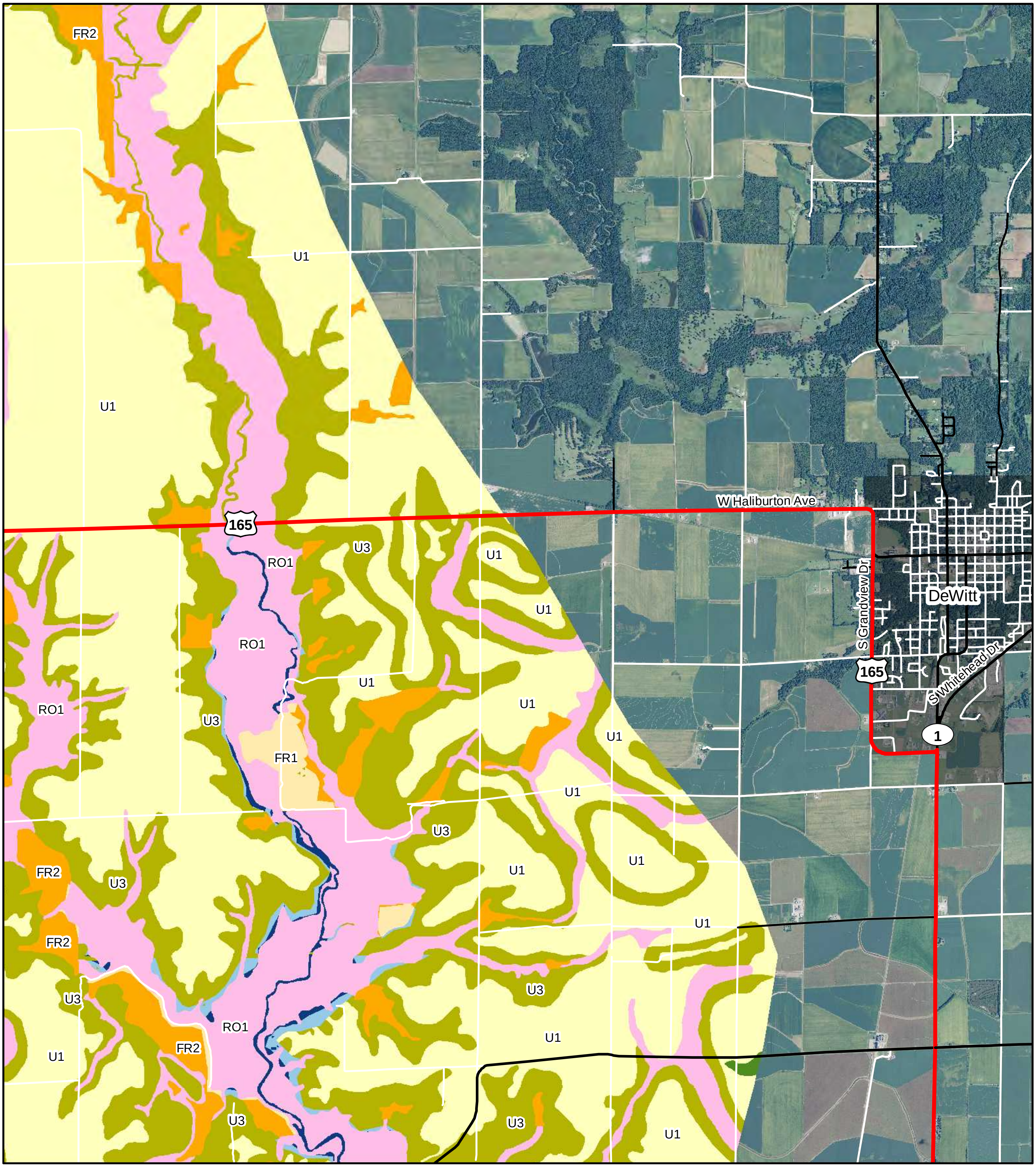
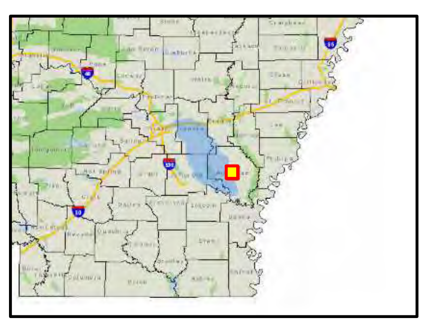
Projection: Transverse Mercator
Datum: North American 1983



0 0.5 1 2 3 4
Miles

R7



N

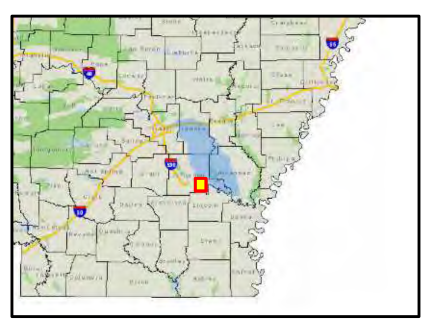
Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

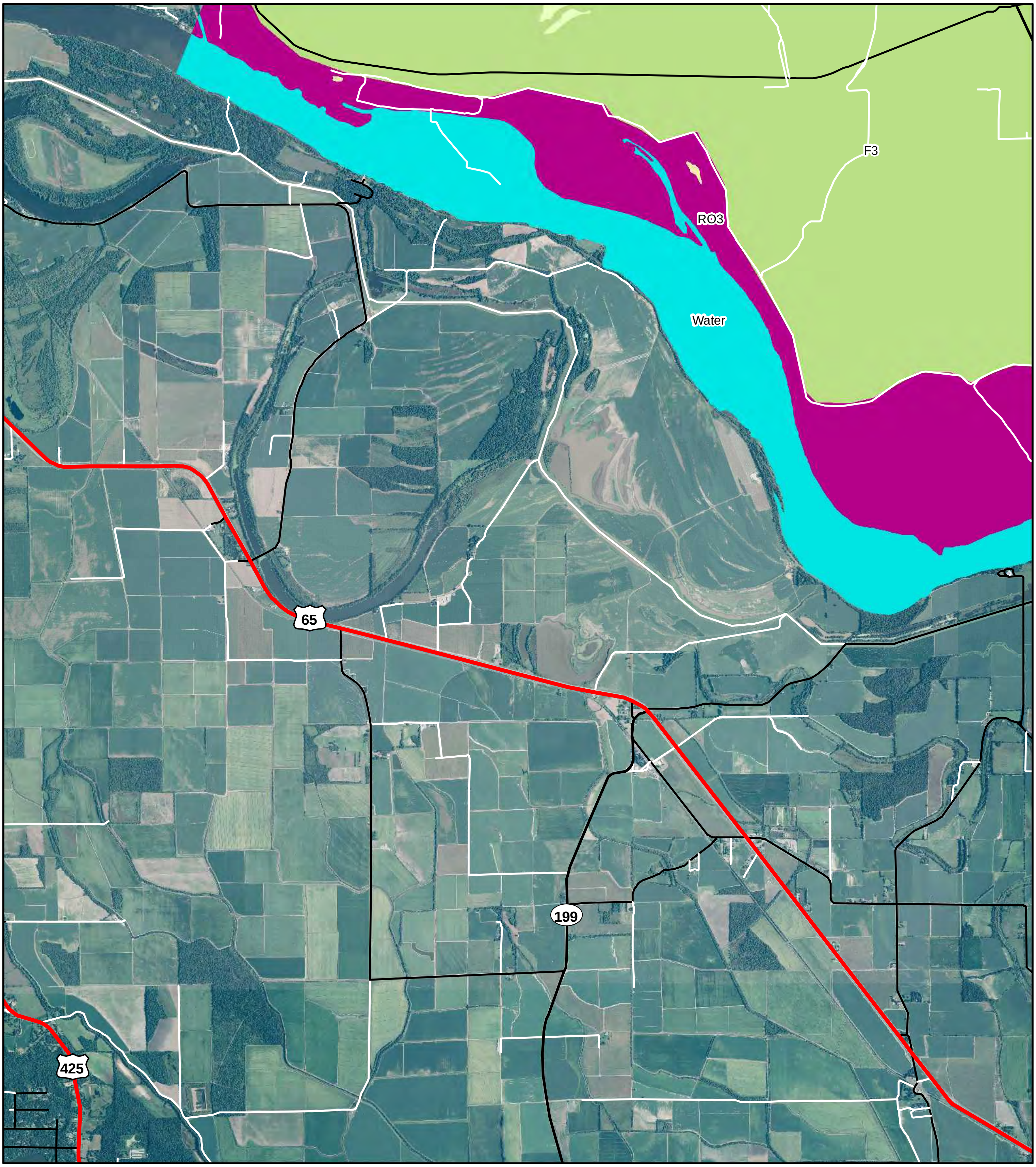
0 0.5 1 2 3 4
Miles

N

S4

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983





0 0.5 1 2 3 4 Miles

S4

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Projection: Transverse Mercator
Datum: North American 1983

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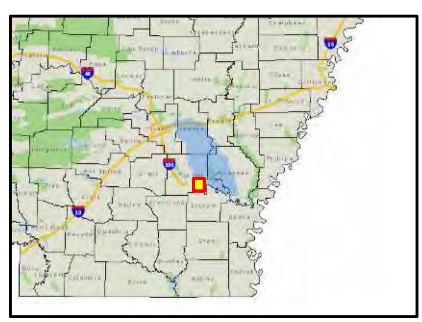

0 0.5 1 2 3 4 Miles

N

Coordinate System: NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983

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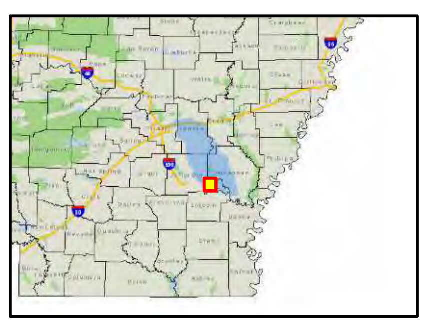

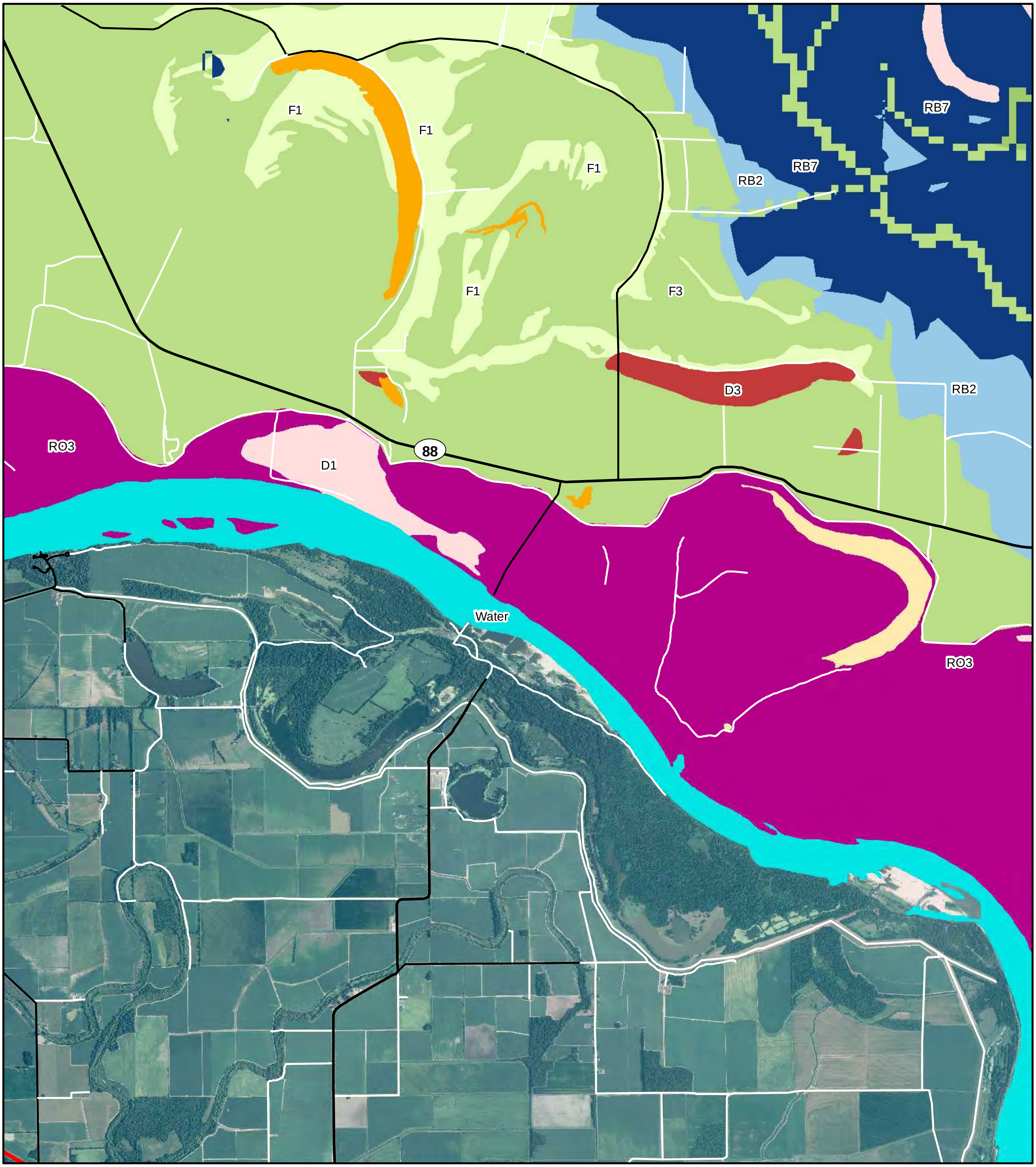

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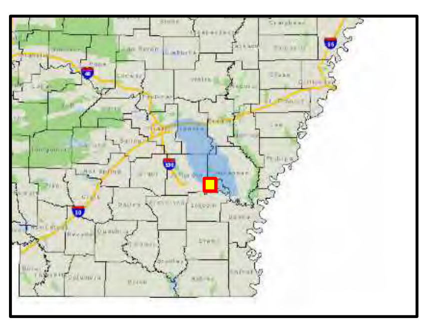

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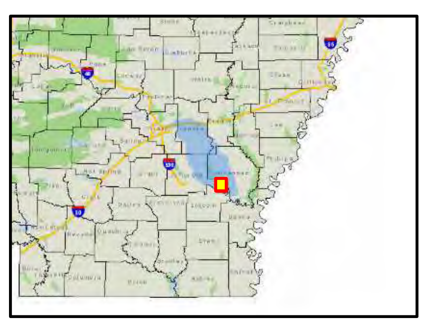

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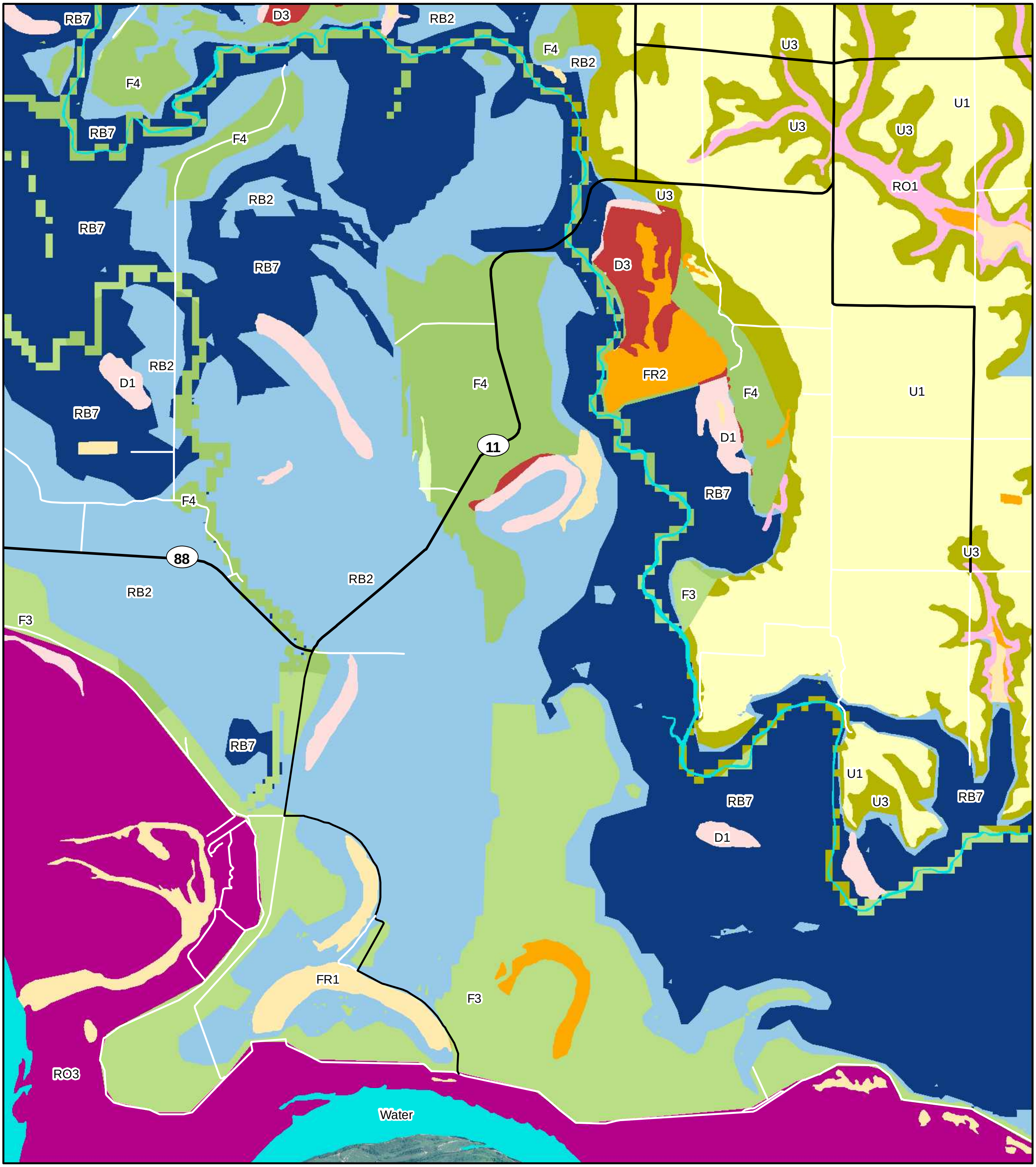

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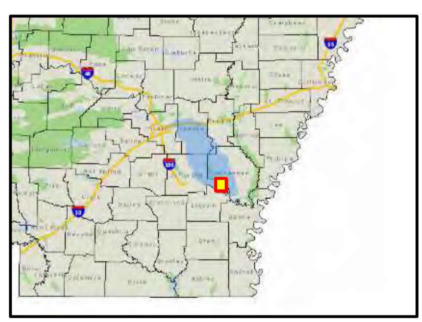

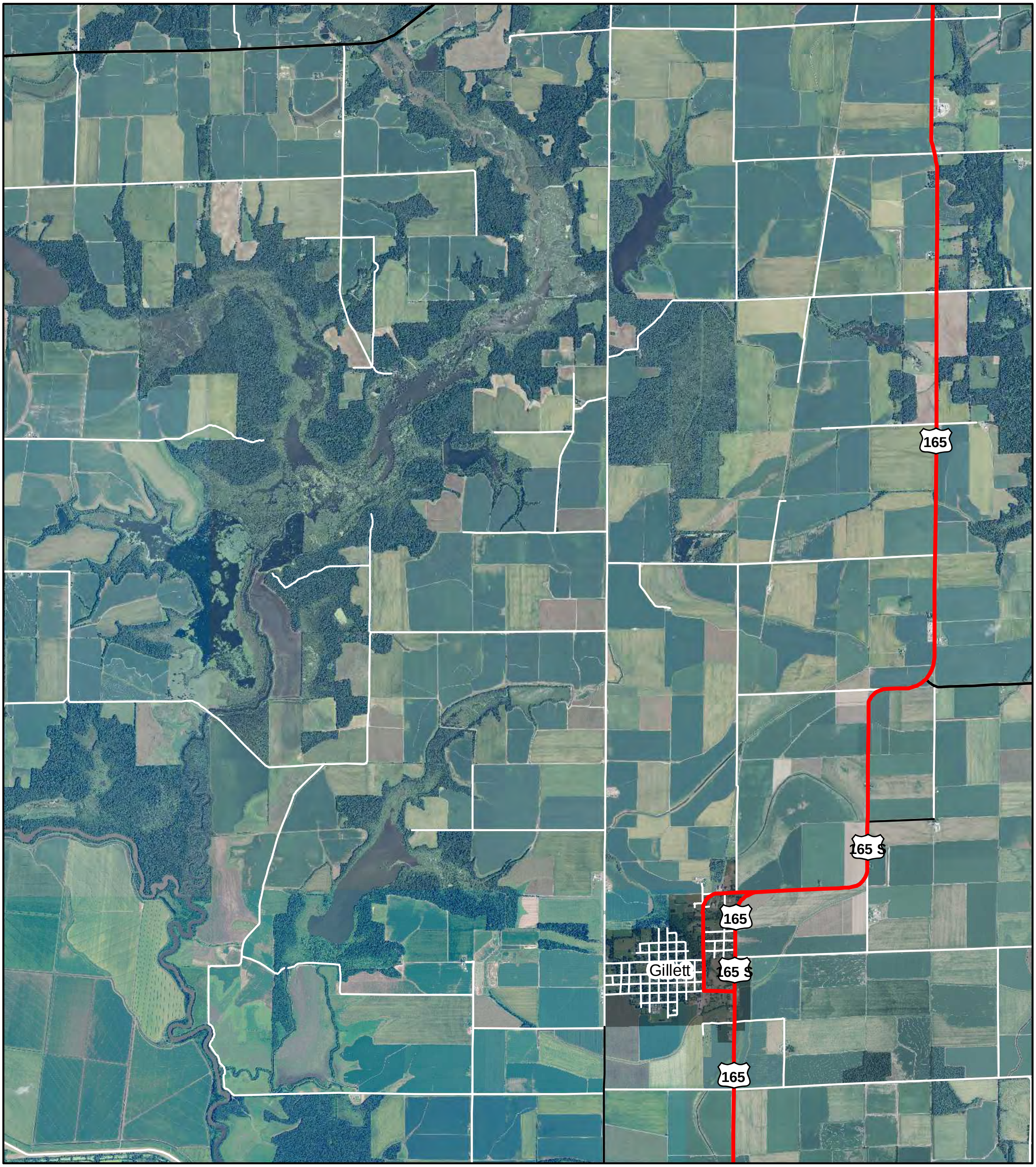

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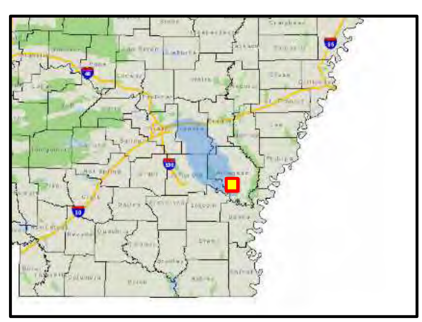

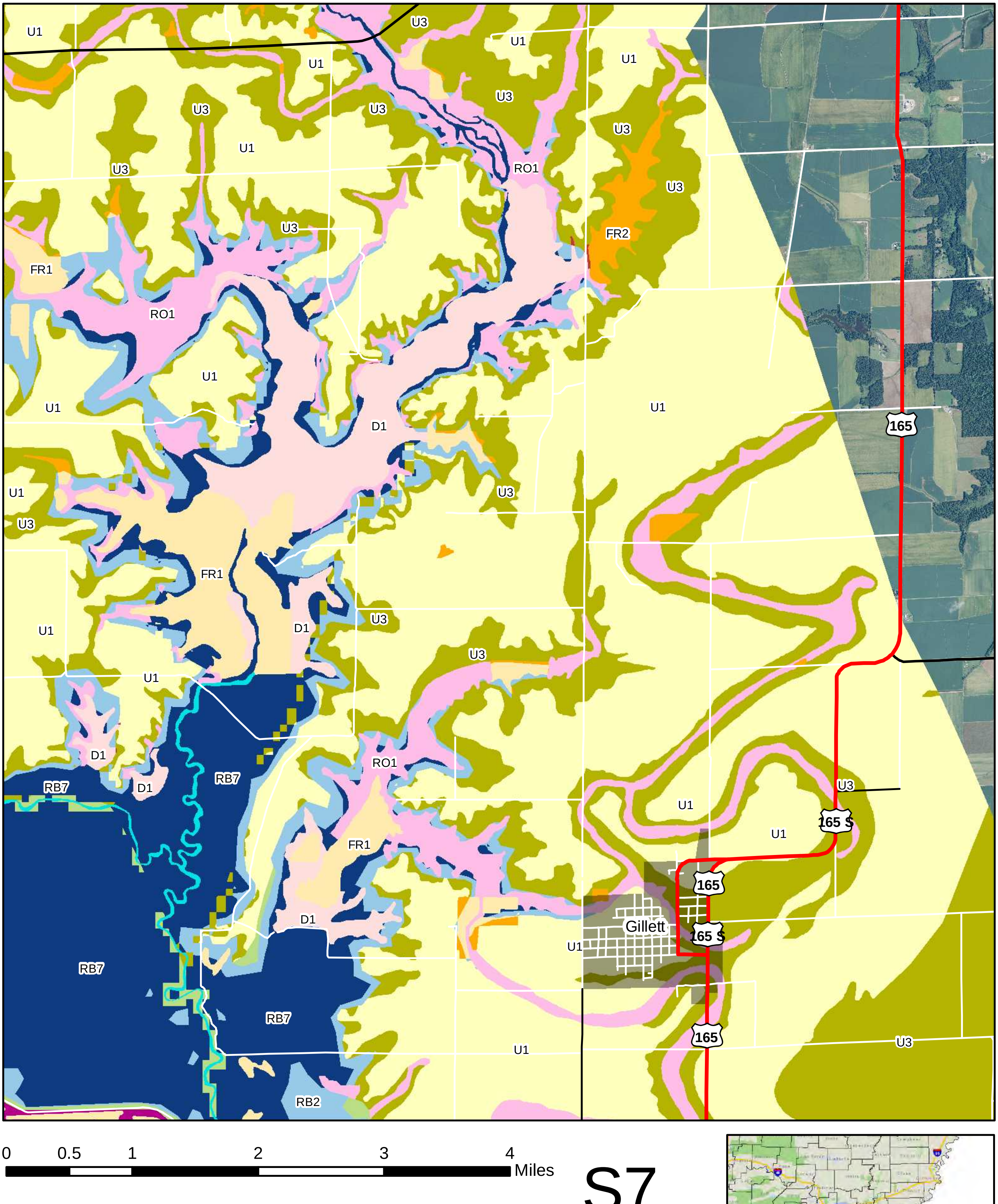

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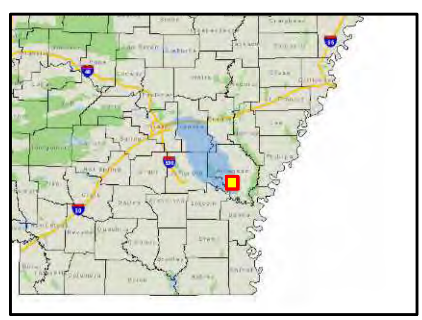

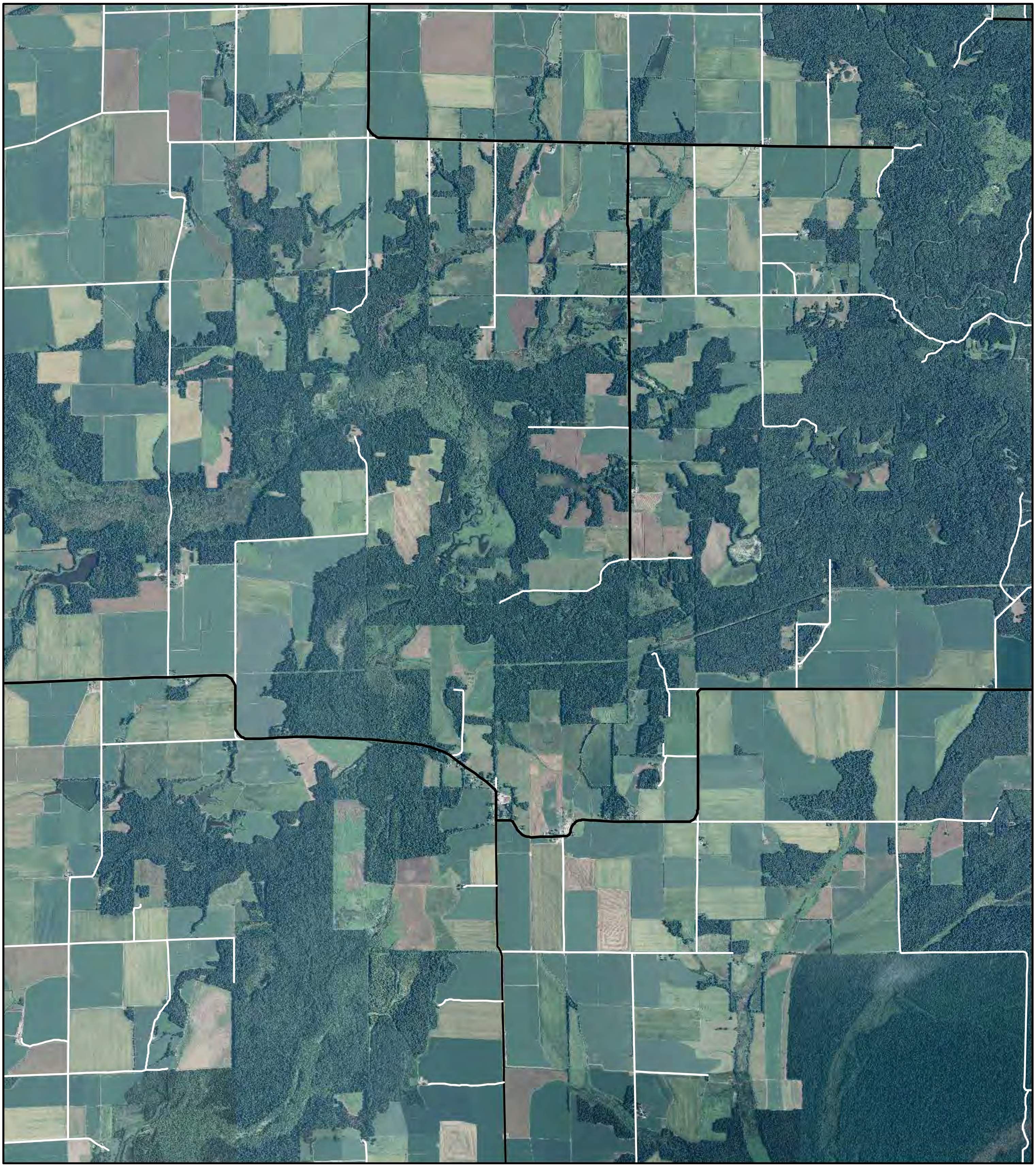

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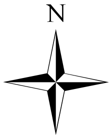

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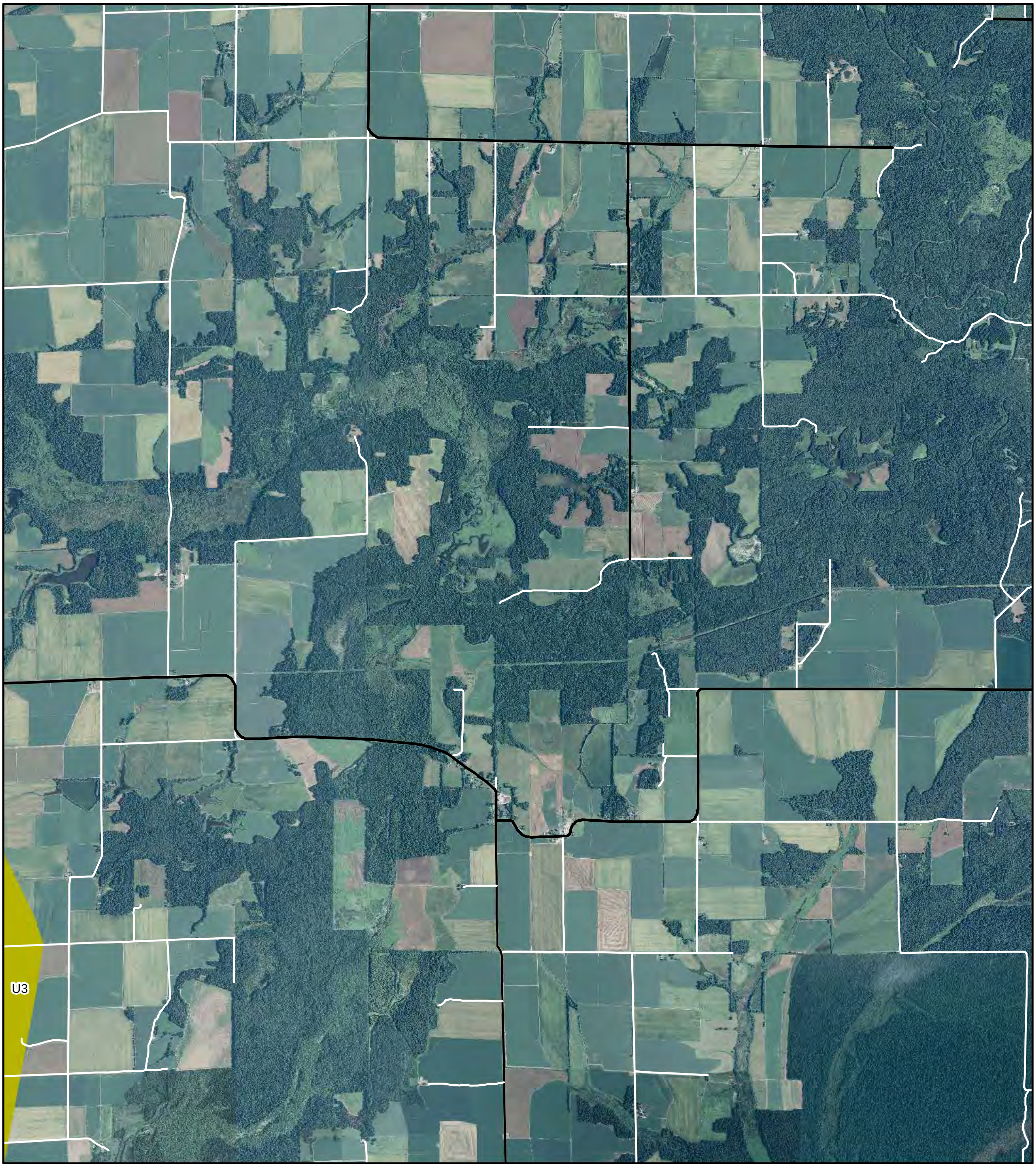

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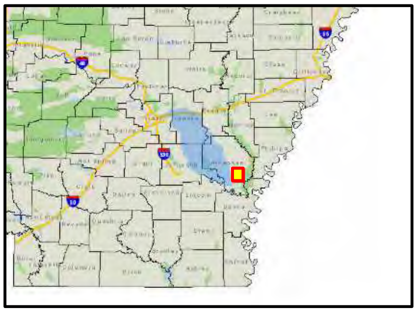

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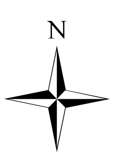

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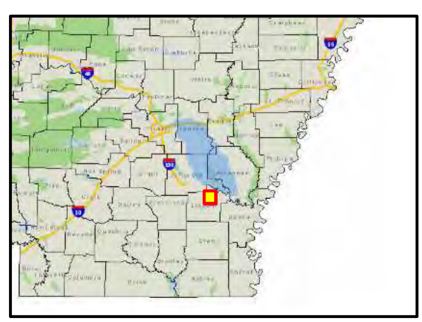

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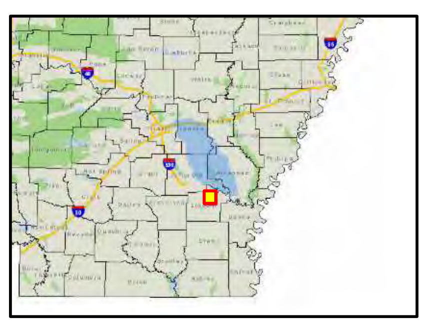

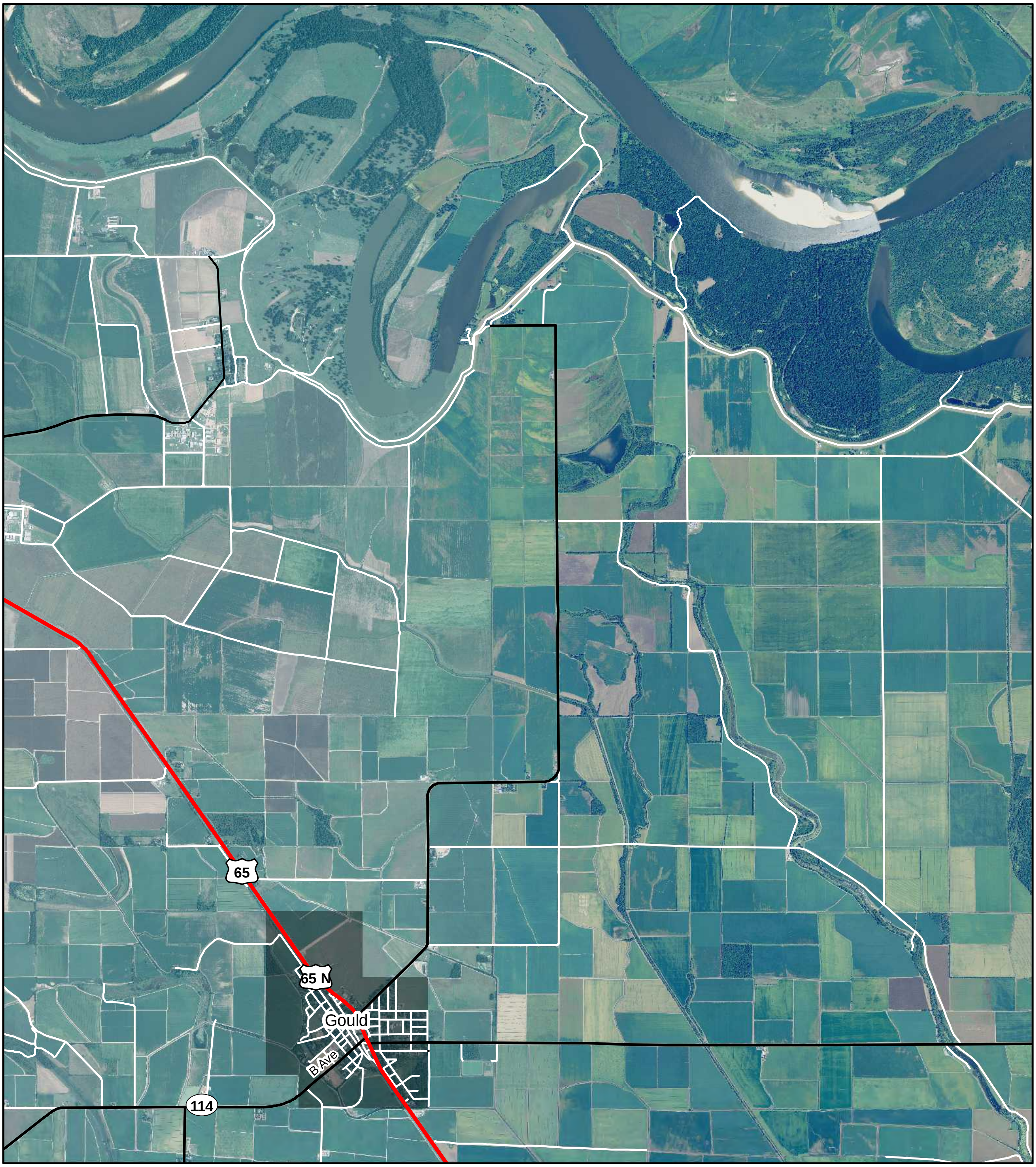

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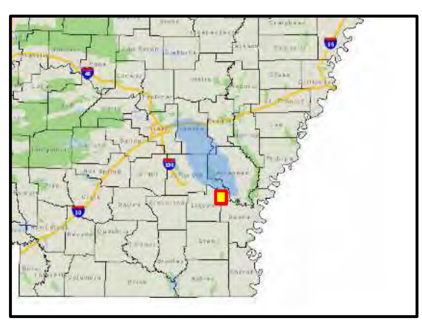

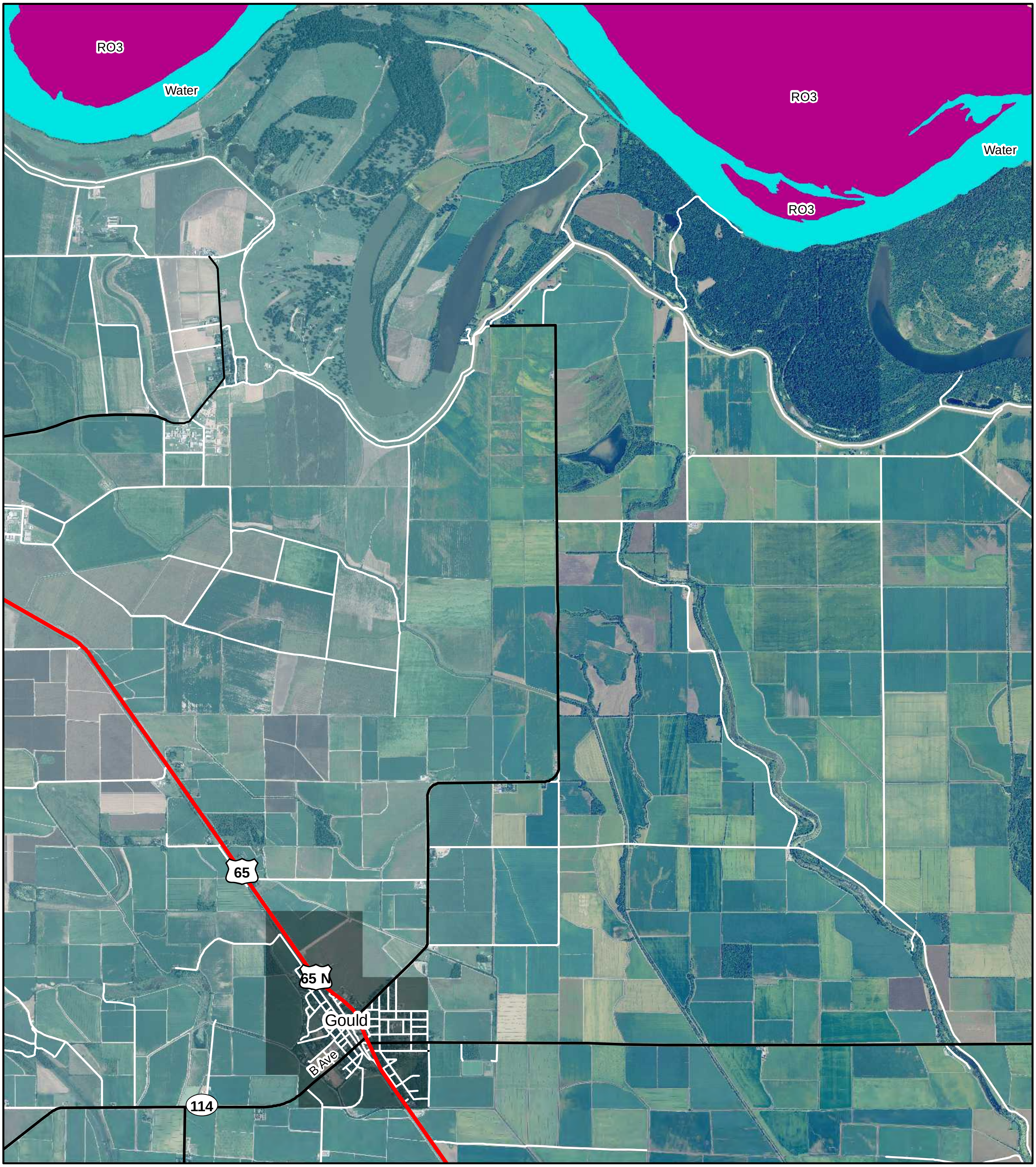

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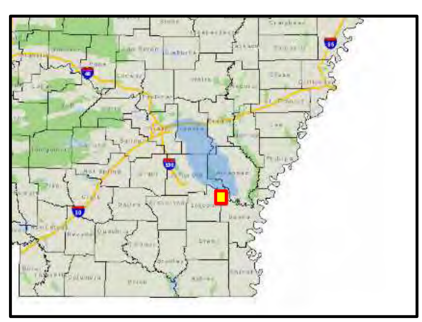

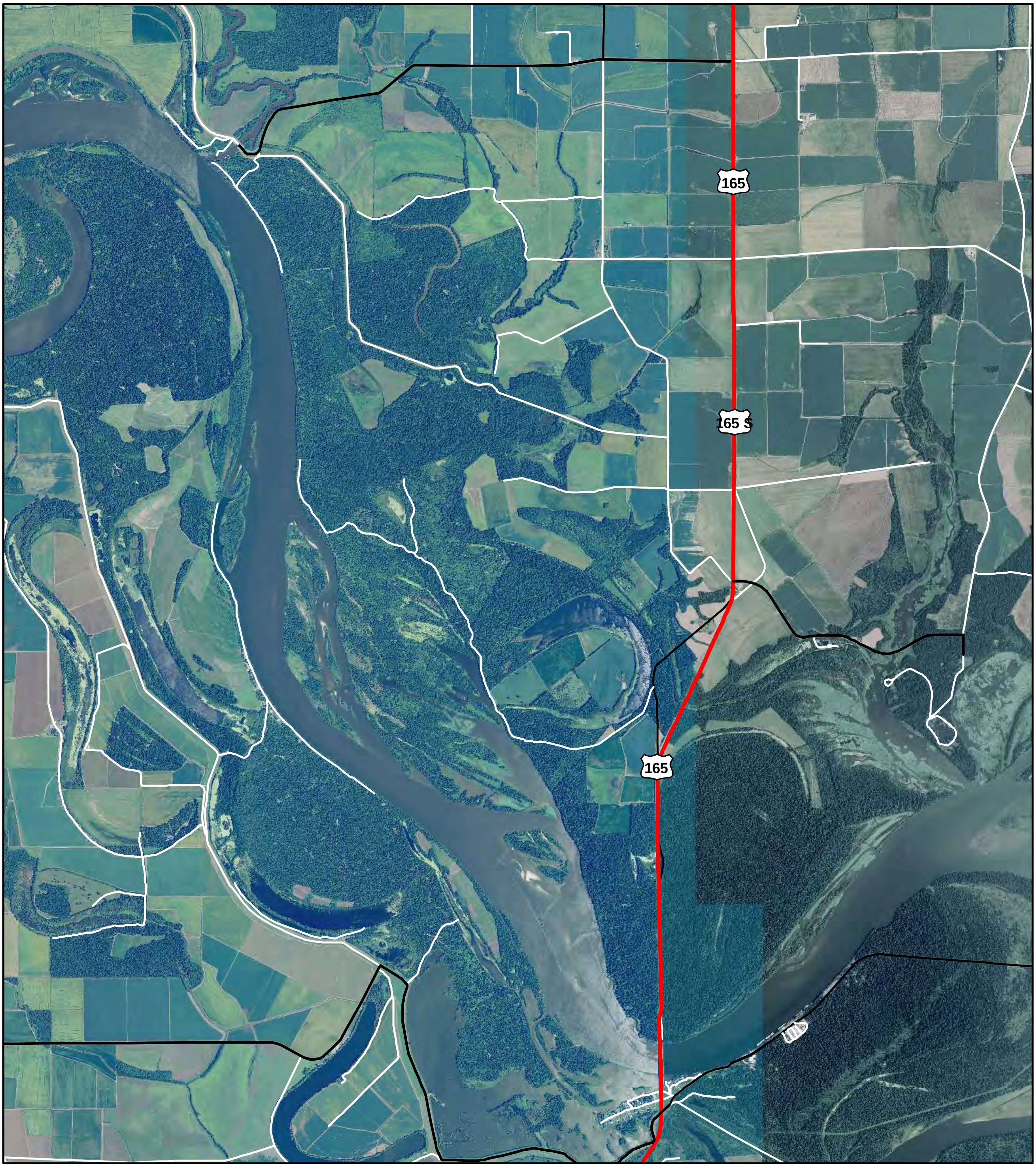

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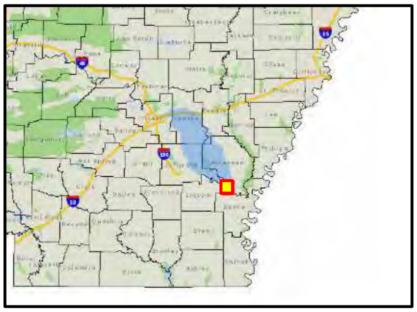

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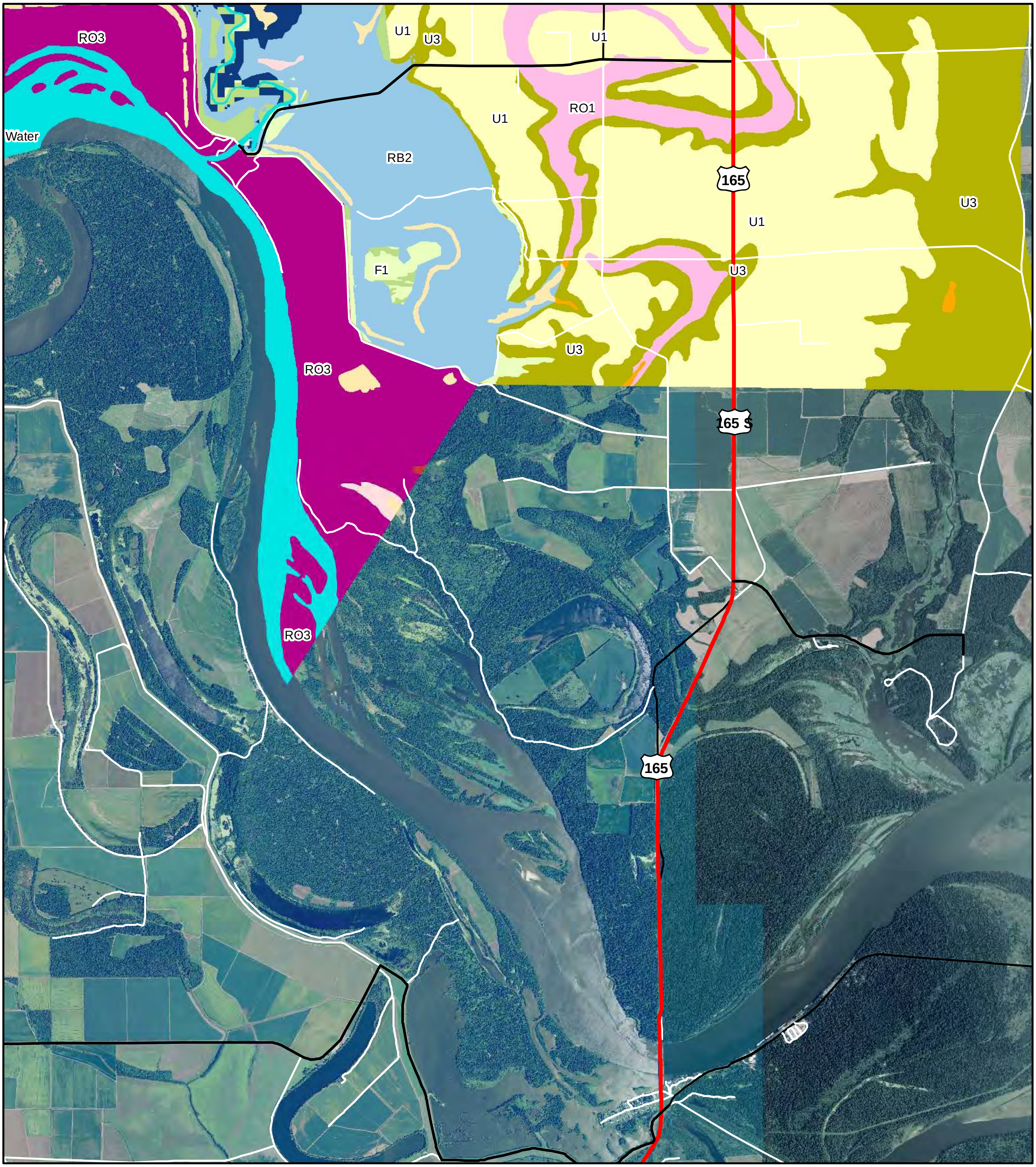

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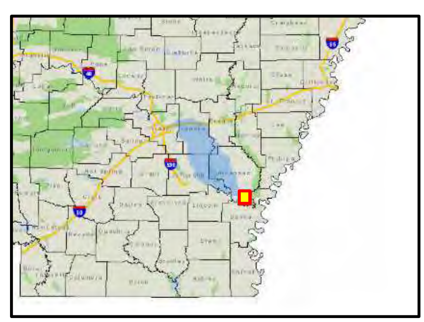

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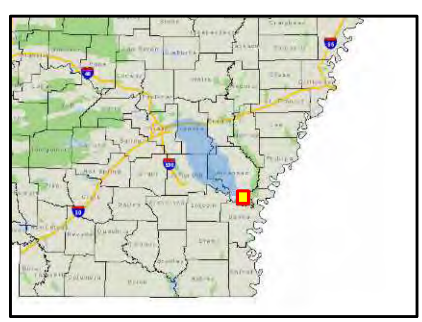

Appendix B: Potential Natural Vegetation Community Characteristics in the Bayou Meto Basin, Arkansas

This appendix identifies groups of species–principally trees– adapted to specific combinations of soils and geomorphic settings within the hydrologic regimes that currently exist on the landscape. Species lists reflect principal dominants and associated species in mature, compositionally stable communities. All of the listed species do not necessarily occur together in a particular stand, but they may be found on similar sites. In some instances, understory species or other characteristics strongly associated with the particular community type are noted. No early successional communities are described, although seral patches exist in all of the community types, and in some settings, such as point bars within and along active channels, they may be extensive. Similarly, the community descriptions do not necessarily reflect the current vegetation found on many sites, which may have established under a previous hydrologic regime or been extensively manipulated. Because the purpose of the classification is to support restoration design and planning, the focus of this classification and map is on the predominant long-term equilibrium condition best adapted to persist on each site under the current hydrologic and climatic regime.

The community type names reflect the landscape setting. See the map legend for the corresponding dominance-type designations.

HGM SUBCLASSES: RIVERINE BACKWATER		
	CHARACTERISTICS	
COMMUNITY TYPE	TYPICAL VEGETATION	DESCRIPTION
RB2 Occasionally flooded, moderately drained lowlands	Dominants: Willow oak Water oak Sweetgum Vernal pools: Overcup oak Green ash	Relatively level or gently undulating lowlands as well as tributary headwater areas on the Prairie Terrace. The strong influence of ponded water reduces species diversity. Willow oak is strongly dominant on most sites and overcup oak is the principal species in vernal pools.
RB7 Frequently flooded lowlands	Dominants: Overcup oak Bitter pecan Understory: Swamp privet Associates on wetter sites: Baldcypress Water tupelo Associates on drier sites: Nuttall oak Green ash Willow oak American elm Persimmon	This community type occurs on a wide variety of geomorphic settings and soil types where forest composition is strongly controlled by extended periods of backwater flooding in most years. The characteristic community is dominated by overcup oak, bitter pecan, and a limited group of associated canopy and understory species. Vines and ground cover species are more abundant and diverse on less flooded sites. Dominance may shift to baldcypress and water tupelo in sumps and along minor interior drainageways. A more diverse species composition may develop on the margins of this type or on somewhat higher microsites within it.
HGM SUBCLASSES: RIVERINE OVERBANK		
	CHARACTERISTICS	
COMMUNITY TYPE	TYPICAL VEGETATION	DESCRIPTION
RO1 Floodplains and terraces of small stream valleys	Dominants: Water oak Willow oak Cherrybark oak Associates: American elm Green ash Persimmon	This subtype occupies narrow valleys draining the Grand Prairie. Streams are small, with narrow floodplains, and transition to slash on the upstream end, and into the backwater zone of larger streams on the downstream end. Sideslope areas above the floodplain are mapped as components of the upland forest type (U-2).
RO2 River swamps in underfit channels	Channel bottom zone: Dominants: Baldcypress Water tupelo Buttonbush	"River swamps" of slow-moving streams that have occupied large abandoned courses of the Arkansas River. Typically a swamp forest of baldcypress dominates the zone occupied by the modern stream at normal flows. The rest of the former channel sideslope supports a series of forest species reflecting flood frequency, from overcup oak adjacent to the cypress community

	Lower bank or narrow terrace adjacent to stream: Dominants: Overcup oak Water locust Bitter pecan Associates: Nuttall oak Water elm Swamp privet Side slopes of abandoned channel: Mixed hardwoods and riverfront species	through natural levee species such as cow oak along the channel rim. A wide variety of other species may occupy the intervening zones. A standard buffer along the center lines of the abandoned courses as mapped on 1:62.5K quad sheets was used to delimit this type; therefore, the boundaries are less precise than other mapped features.
RO-3 Riverfront natural levee and point bar	Dominants on Bayou Meto and tributaries: Sycamore Sugarberry American elm Dominants on natural levees of Arkansas River origin: Cottonwood Box elder Sycamore Vernal Pools: Overcup oak Bitter pecan	Vegetation composition and structure on these sites is related to proximity to the channel and associated high flows, light availability, and sedimentation. Most of these sites are on substantial natural levee deposits, but point bar deposits with little or no natural levee are included if they are directly adjacent to the channel. Deposits of Arkansas River origin characteristically are dominated by eastern cottonwood, which is replaced by sycamore on sediments deposited by smaller streams. Where large swales occur between levee deposits, narrow vernal pools support overcup oak, bitter pecan, and similar species.
HGM SUBCLASS: FLAT		
COMMUNITY TYPE	CHARACTERISTICS	
	TYPICAL VEGETATION	DESCRIPTION
F1 High natural levees	Dominants: Cottonwood Water oak Pecan Cherrybark oak Associates: Sweetgum Sugarberry	High, well-drained linear features that were originally formed along the banks of the Arkansas River, though they may be far removed from the river now. They are diverse sites of marginal wetland character, and may have substantial slope, but are classified as flats because the principal source of water is precipitation.
F2 Well-drained recent alluvium in lowlands	Dominants: Cherrybark oak Sweetgum Cow oak	Diverse communities on well-drained sites not subject to regular flooding. Commonly on natural levee and point bar deposits of Bayou Meto and smaller tributaries, including abandoned channel segments such as oxbow lakes. Cow oak and cherrybark oak are characteristic.

	Associates: Water oak Sycamore Shagbark hickory White oak	
F3 Well-drained older alluvium in lowlands	Dominants on ridges and flats: Cow oak Cherrybark oak Water oak Sugarberry Dominants in swales: Green ash Nuttall oak Associates: Pecan Box elder Shagbark hickory Occasional components: Bur oak Delta post oak Southern red oak	Older ridge and swale point bar deposits of Arkansas River origin; thus, features tend to be large. Vernal pools in swales are extensive, and smaller microdepressions are common. Large tracts of this type have been cleared and leveled for agriculture, and restoration requires re-establishment of these features to store precipitation and maintain the original wetland character and diversity of the ridge-and-swale forest type.
F4 Moderately drained lowlands	Dominants: Water oak Delta post oak Cow oak Mockernut hickory Vernal Pools: Willow oak Green ash Nuttall oak	Gently undulating, moderately drained point bars and veneered backswamps of Bayou Meto. Similar settings elsewhere in the Mississippi Valley typically have a higher component of sugarberry and American elm, but these are largely replaced in Bayou Meto by a strong water oak component and a mix of other species such as Delta post oak and mockernut hickory. Nuttall oak, green ash, and willow oak dominate in the vernal pools formed in swales. These pools tend to be somewhat smaller and shallower than those found in the F3 community type, but are also significant to the maintenance of wetland conditions and should be restored prior to reforestation if they have been filled or leveled.
F8 Poorly drained level topography on Pleistocene outwash terraces	Wet Prairie Dominants: Switchgrass Gammagrass Prairie cordgrass Velvet panicgrass Big bluestem Indiangrass Slash Dominants: Sugarberry Green ash Green hawthorn	This type comprises complexes of wet prairie and slash habitats of the Prairie Terrace. Wet prairie occurs where soil conditions, the presence of shallow relic depressional features (e.g. old Arkansas River channels and swales), and the size of the local drainage source area all promoted development of wet inclusions within larger dry prairies. Slash habitats occur in the heads of drainage systems, and boundaries between the typical slash vegetation and adjacent prairie or forest were influenced by varying moisture levels and fire frequencies.

	Stiff dogwood Deciduous holly American elm	
F9 Flatwoods on poorly drained sites of the Prairie Terrace	Dominants: Cherrybark oak Post oak Associates: Delta post oak Southern red oak American elm Vernal pools: Willow oak Green ash	“Flatwoods” of the Prairie Terrace where precipitation ponds shallowly but soils are not appropriate to sustain prairie. These forests are characterized by a high degree of interspersion among micro-habitats, including upland species on mounds, post oak or mixed hardwood flats between mounds, and large, shallow vernal pools dominated by willow oak and ringed by mosses. Similar sites with very shallow fragipans are likely to support wet prairie or savanna.
F13 Hardwood flats, Early Wisconsin Valley Train and Deweyville Terraces	Dominants: Delta post oak Post oak Vernal Pools: Willow oak Nuttall oak Green ash	Soils do not distinguish this setting from adjacent surfaces, but geomorphic origin was distinctly different and produced very large vernal pools and depressions that may have functioned differently from those elsewhere in the basin. Evidence regarding species composition is largely inferential from other similar sites outside the Bayou Meto Basin and small disturbed fragments within, since nearly all Deweyville terrace sites in the basin are currently in agriculture.
HGM SUBCLASSES: CONNECTED AND UNCONNECTED DEPRESSION		
COMMUNITY TYPE	CHARACTERISTICS	
	TYPICAL VEGETATION	DESCRIPTION
D1 D3 Stream-connected and unconnected depressions in abandoned channels	Dominants: Baldcypress Water tupelo Overcup oak Bitter pecan Understory and associated species: Water elm Waterlocust Swamp privet Buttonbush	Topographic depressions with very poorly drained soils in former stream channels and large swales. Connected depressions are connected to downstream systems by a perennial stream channel or are within the 5-year floodplain. Unconnected depressions meet neither of these criteria. Species composition is restricted to the most water-tolerant plants, which distinguishes true depressions from vernal pools. Vines and ground cover species are uncommon.
HGM SUBCLASSES: CONNECTED AND UNCONNECTED FRINGE		
COMMUNITY TYPE	CHARACTERISTICS	
	TYPICAL VEGETATION	DESCRIPTION
FR1 FR2 Stream-connected and unconnected lake and pond fringe wetlands	Common dominants in systems with natural fluctuation patterns: Baldcypress Water tupelo	Wetlands within permanent lakes and ponds, including borrow pits, but not aquaculture ponds. Natural systems typically support baldcypress and tupelo forests within the fluctuation zone and in the immediate lakefront zone where water tables remain near the surface. Buttonbush thickets may

	Buttonbush Numerous herbaceous species Common dominants in systems with highly modified fluctuation patterns: Black willow Buttonbush American lotus	dominate in shallow, near-permanent water, and zones of emergent species are usually present, with erect rooted species in shallow water, floating-leaved species in deeper water, and submerged aquatics present throughout the open-water area. Where water levels are manipulated, these patterns are usually altered in various ways. Because water depths and fluctuation patterns are unknown, the entire water body is mapped as fringe wetland. Connected fringe wetlands are connected to downstream aquatic systems by a perennial stream channel or are within the 5-year floodplain. Unconnected fringe wetlands meet neither of these criteria.
HGM SUBCLASS: UPLAND		
COMMUNITY TYPE	CHARACTERISTICS	
	TYPICAL VEGETATION	DESCRIPTION
U1 Prairie and savanna of the Prairie Terrace	Dominants: Big bluestem Little bluestem Indian grass Switchgrass Associates: Various prairie forbs	Non-wetland prairie of the Prairie Terrace, original distribution is estimated from historic maps and soils. Boundaries vary over time depending on fire history. Areas that were likely to have been predominantly savanna are included in the U3 map units.
U3 Upland forests of the Prairie Terrace	Southern red oak/post oak woodland or post oak savanna on surfaces of the prairie terrace not occupied by wetlands or prairie. Post oak savanna along rim and upper side slopes of prairie terrace, transitioning to Delta post oak on lower slopes and Holocene and Deweyville surfaces. Riparian sideslopes include mixed species, transitioning from white oak, swamp chestnut oak, persimmon, and red maple on lower colluvial areas to post oak on upper slopes.	This upland subtype includes a range of community types that reflect differing soil and drainage conditions, as well as changes in fire patterns that have tended to reduce the former extent of savanna areas.

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14. ABSTRACT

Over the past three decades, extensive field studies of wetland plant communities have been conducted in the Mississippi Alluvial Valley. These field studies have been carried out for various purposes under the auspices of federal and state research programs or in conjunction with Corps of Engineers project planning efforts. In the process, a wetland site classification approach has evolved based on hydrology, soils, and geomorphic setting. The research data and classification system have been recently used for a new purpose: to create a set of Potential Natural Vegetation (PNV) maps covering more than 26,000 square miles within the region. The purpose of PNV maps is to serve as blueprints for restoration planning and prioritization. Due to the fact that the hydrology of the landscape has been permanently changed by major flood control projects, the PNV maps do not represent the distribution of the original, pre-settlement vegetation. Rather, they identify the natural communities that are appropriate to the modern altered site conditions. By using these maps, persons interested in restoring particular tracts of land can identify the plant communities appropriate to the conditions present. Conversely, individuals interested in restoring particular plant communities can identify parts of the landscape that can support each respective type. The PNV maps are available for use in a Geographic Information System, where a range of complex restoration scenarios (such as the development of wildlife travel corridors or refuge areas) can be explored efficiently, and alternative approaches can be compared to one another in terms of costs and ecological effectiveness. This report is one of six Field Atlases that present the same data in a downloadable, printable format at a scale of 1 in. = 1 mile.

15. SUBJECT TERMS

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Potential Natural Vegetation (PNV) maps
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